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A Post-War Impression of the Cathedral at Reims

By Kenneth John Conant

ONE sees the buff-brown towers of the cathedral long before the train pulls into the battered station at Reims, and the traveller who is approaching the city for the first time since the beginning of the war cannot help regarding the old pile with an anxious interest. The barbed wire, the newly-filled trenches, the half-effaced shell-holes, have their counterpart elsewhere, but the fascination of the old church is in its way unique. Standing high above the broken town, it all too evidently shares the curious unkempt look which all the devastated countries have: a curious neglected air quite different from what is usual in France. Once out of the station, it is the first thing to seek. The way lies past the narrow fringe of habitable buildings about the station square, and into a melancholy district of hopeless ruins. Their silhouette against the sky is the crazy zigzag of roofless gables and fallen walls, interrupted here and there by smokeless chimney-pots. Where a house has two walls, its interior, blackened and tenantless, will show nothing but scattered débris and perhaps a few sagging and rusted iron beams. The avalanche of broken rubble which once blocked the streets has been piled waist-high to either side, resembling (for the stone, like the dust inch-deep underfoot, is white) the piled-up snow after a heavy fall. Curiously dull and unreal, the occasional foot passengers add very little cheerfulness.

The north tower.

It is therefore with a kind of relief that one comes upon the cathedral, which is still tolerably complete and not so very different, at first glance, from what it was in happier days. There are broken shafts and pinnacles; there is the tell-tale stain of calcination at the north, and one feels immediately that the whole is bruised—has lost its crispness and freshness. But it is undeniably a great relief to see the huge bulk of the building still very much in place in spite of five years of bombardment and enforced neglect. It towers over the puny ruined constructions around it as mightily as ever, and the glimpses one catches of it through breached walls and collapsed houses are the best assurance that the old giant stood the ordeal very well. The square in front suffered extensively from shells and fire; it is now bordered with flimsy post-card booths. The cathedral itself is closely invested by a picket fence which encloses piles of broken stone taken from the cathedral and round about as well.

Visitors are not allowed within except to make the regulation visit in the care of a didactic guardian. This really amounts to little more than a glimpse, being limited to the first nave bay, and from there much of the important damage is invisible. The sensation is therefore again of relief, in spite of the calcined aisle portals, the punched and discolored vaults, the scarred tracery, and the dismantled choir. Though obviously in no condition for use, it gives the impression that its rehabilitation will, after all, be a simple matter. The tourists are properly impressed by the collection of shells to be seen just beyond the railing, one of them a large one which entered the building but failed to explode. It is on the exterior, and particularly the exterior of the chevet, that the work of the shells is apparent. While examining this portion of the building the most sanguine optimist is sure to cool a little.

As a matter of fact, the casual visitor does not get anything like a true idea of the injury to the building. There are two reasons for this—first, he cannot realize its colossal size, for the scale is deceptive; and second, because, being surrounded by all sorts of ruin and destruction, he thinks of the injuries to the cathedral in terms of thickly-scattered

Looking across the ruins.

shell-bursts rather than in terms of the slow, patient work which will be required in the carving of new stones to take the places of the shattered ones, and the tedious labor of remaking, one by one, all the multiplicity of broken details. To arrive at an understanding of the sum of the damage calls for intimate study. And curiously enough, the first relief and optimism fade away as one returns again and again to the building. A sober realization of the immense task—of the amount of effort in detail which will be needed to repair the thousands upon thousands of damaged items is enough to abate the most ardent hopefulness. The writer had entirely unusual privileges about the building and was allowed to study it bay by bay, inside and out, freely and at leisure. As the basis of this article a complete detailed catalogue of the damage was drawn up; a copy of this catalogue, the first such list to be made, was given to and acknowledged by the authorities. In making it, the author climbed galleries, turrets, and towers, and examined the condition of all parts of the structure close at hand.

The losses the building has suffered are inevitably divided into three classes: first, essentially unimportant superficial damage and injury to minor parts; second, heavy damage to the essential frame, and third, damage to the valuable decorations. These will be treated in order.

The more one studies the state of the structure, the more one is amazed at the amount of small damage there is—damage that would attract little notice but for the appalling quantity of it. Small broken pinnacles, finials, and crockets, pitted mouldings, plain surfaces raked by shell fragments, disfigured capitals and other carvings, scarred shafts, dislocated copings, shattered canopies are seen by the hundred, in every direction. They make only a general impression in the effect as a whole because of the vastness of the building, but as one becomes more and more familiar with it, one is overcome by the incredible extent of this sort of thing. How many shell-scars there are it would be difficult to say. The shells left no corner of the exterior untouched, and the interior is scattered with their traces (though much more sparsely) from portal to apse. To get some basis for an estimate, a count was made of the marks on a buttress that had been liberally cut up by flying fragments. The lower part of this buttress had no less than 1,115 scars on the outer surfaces, ranging from the size of a thumb-print to that of a pie-plate. There can therefore be no less than 100,000 in all, and 10,000 of these of some size. Another example of the extent of this small damage is furnished by the parapet. The portion over the nave walls had nearly 200 small pinnacles, of which hardly 50 remain complete. There are five breaches in this portion, but that is not all of the damage, for most of the stones on the inner face were split or cracked by the fire which destroyed the great wooden roof. Of all the coping-stones on the battlements which crown the continuation of this parapet around the choir, only two are still perfect. Small as this parapet appears from the ground, it will take several carloads of stone to replace what has been blown away: there are eleven breaches in all. Again, most of the exterior face of the triforium wall was calcined by the fire which destroyed the aisle roofs, and the carving on the clearstory string-course was quite ruined. Many of the bases of the great interior colonnade were calcined by the blazing straw stored in the building during the fighting, and by the fire which destroyed half of the stalls. Examples like this could be cited from any series of details, and it is difficult to insist too much on the uncanny thoroughness of the shells and fire in injuring small details. By patient work a great deal of this can be repaired. It is not the kind of work which can be done rapidly or wholesale, and a great part of the surfaces will have to be left as they are, disfigured. What repair work is done is likely to injure the patina of the building gravely.

As regards the heavy damage, the situation is oddly different. Most of it can be repaired almost at leisure with little hurt to the appearance of the building. It is confined to severe injury to one pier and a number of buttresses, damage to most of the vaults, and the loss of the roof with its belfry and flèche. The destruction of the old charpente is deplorable, but it was perfectly documented and can be rebuilt just as it was unless the authorities decide to replace it in steel. This latter is the sensible thing to do, for any wooden construction will give up sooner or later to fire or decay. This is the second such fire at Reims. Had the old roof been of steel, the damage to the walls, to the vaults, and to the stained glass (from the blazing side roofs), would have been very much less, while the beautiful flèche might have been saved.

The heavy high vault, twenty inches in thickness, was punched in several places. As shown by its discoloration, it was unfavorably affected by the fire, so that stones have kept falling continually, loosened by the rain. There are now considerable holes in five or six places. The vaulting of the crossing and adjacent bays to the south and east has fallen in almost completely, but this is no misfortune, as will appear. There are fissures in almost all of the vaults at both levels, but few of these are threatening. Too much admiration cannot be given the original construction, which, after centuries in place, resisted destruction so sturdily. Ordinary vaults would have dropped like a shot. In spite of the fall of tons of block stone upon them, some of it from sixty feet above, only two of the lower series of vaults failed badly. Although cracked and loosened by exposure to the weather, they will not have to be taken down. The scheme to be followed in general is to rake out the old mortar from the joints and carefully repoint them, supplying the missing parts as the work progresses. As a great deal of

fallen stone can be used over again, this work will be comparatively easy.

The repair of the vaults about the crossing will naturally be linked up with that of the southeastern great pier, the only pier to suffer. It is still mostly in place, though somewhat precarious. The shells struck it at the clearstory level, and in addition to numerous vertical cracks, caused horizontal sliding on five or six joints, so that the body of the pier, cracked free from the main walls, is tipped inward toward the nave. The fall of the three vaults it supported may have prevented its failure. The plan of the architect is to put the centring and the new ribs of the vaults in place and then replace the unsound portion of the pier, working around it bit by bit. That done, it will be a simple matter to renew the vaults, the smashed tracery, and the broken mouldings. It is evident that the interior will not show the effects of its evil days as far as construction goes. Probably a great many of the minor scars will be left as they are.

The flying buttresses by no means escaped their share o injuries. Direct hits were made on a considerable number and nine were thus shot away. Nothing has been done toward their repair; the bulk and inertia of the construction will enable it to stand for some time without them, but of course the sooner they are supplied the better. Much work will have to be done on the great pinnacles at the same time. Their condition shows that they intercepted many shells which might have done more vital damage elsewhere; some of them are a good deal smashed up. Something will have to be done also for a number of the chapel buttresses below, and for the towers at the south and west ends, all of which show considerable dislocation due to direct hits.

The third kind of injury is that to the decoration. There is much to be thankful for, for the injury is less than is generally supposed; moreover, the lost items are perfectly documented. Nevertheless it is impossible to be resigned to the loss which has occurred. It will always be regretted because it is irreplaceable. A multitude of minor carvings, such as gargoyles, small figures, and leafage, have been spoiled, and at least half of the more important pieces have received noticeable injuries. A good part of this dates from 1914. To the burning of the roof is due the ruin of the back faces of the western towers; to the burning of the scaffold about the north tower is due the most deplorable injury of all, that suffered by the northern half of the façade; and to shell-fire is due the damage suffered by many fine sculptures around the rest of the building. A number of the kings in the great gallery are in a more or less hopeless condition, but their merit was very moderate and their loss is correspondingly less regrettable. Thirteen of the attractive canopied angels are badly damaged. Every one knows, too, that the great western portals have suffered seriously. The damage to the canopied groups on the reveal of the arches is rather extensive. Just what will be done about the great figures below is uncertain. Many heads have been picked up and it would be possible to reproduce existing casts of destroyed portions, but whether a restoration of this sort will be attempted remains to be seen. Of the thirty-five fine statues at the sides of the doors, only three (all on the north porch) are a total loss. Five are badly wrecked, four are much broken, but still attractive, fifteen have minor injuries, and eight are untouched. The effect of the portals from a little distance is not bad even now, and they can be made fairly presentable by supplying the numerous missing crockets, pinnacles, and other minor carvings, but of course they will never again be what they were.

The glass of the cathedral is another loss of capital importance. It is perhaps less than is generally supposed, however. The aisle and chapel windows were all modern, mostly of plain glass, so that they can perfectly well be replaced. The same cannot be said of the clearstory windows. They were all old glass of great value, and all suffered very regrettable damage from fire, from shell-fragments, and from concussion before they were finally taken down. A few of the windows are fairly presentable; half of the western rose still exists, and something was saved of almost every other window. It has been said that about half of the substance of the windows was rescued. That we have even so much is due to the Paris firemen who, suspended on ropes, climbed about the lofty windows and dismounted the frames during bombardment.

At the crosing of the south transept.

Aside from all the obvious damage some account must be taken of cracking and dislocation throughout the mass of the masonry generally, the result of shock. My attention was particularly called to this by the architect in charge. It is not the sort of thing one notices from the ground. But it will be a large item in the restoration. The scheme is to rake out weakened joints and repoint them very carefully. This, the administration believes, is essential in order to reconsolidate the building. That it will prolong the work goes without saying. I have tried to make it clear, however, that most of the work to be done about the cathedral is tedious detail work of just this character, rather than a wholesale rebuilding. In this fact is at the same time the hope and the despair of those concerned with the structure.

The restoration is in the hands of M. Henri Deneux, whose title is Architecte en Chef des Monuments Historiques. He is a grave, unassuming gentleman admired by all who come into contact with him. He knows the building better that any one else, having worked about it for many years and made a splendid series of measured drawings of it. During the war he had charge of protective works at Reims and elsewhere, and indeed received a shower of broken stone while at work one day during a bombardment of the cathedral. Not long after Reims was finally out of range of the enemy he took up the work of rehabilitation. A gang of prisoners was set to work at cleaning up. A temporary roof was supplied, a considerable undertaking, involving 60,000 square feet of corrugated iron and much wooden truss-work. The latter could not be made up on the spot because of the lack of all things essential, but was prepared in Paris and shipped up by rail. Work was finished in August, 1919. That it took so long will surprise no one familiar with the situation in the devastated districts, where the labor and transportation situation is so difficult that some begrudge even the small crew at work on the cathedral. Theoretically

the restoration will be paid for by the Germans, but the French state can give it only a minimum allowance while whole populations are still living in shacks and cellars. Yet an effort was made to install the clergy in some corner of the church. The parish has worshipped in a very modest hall two or three squares away. Excavations have been undertaken in the choir for the investigation of the foundations and a series of old tombs known to exist below the pavement. They have accomplished more than was expected, for they have brought to light a beautiful flamboyant jubé that was broken into thousands of pieces at some time and used as fill. How any one ever had the heart to smash up such an excellent piece of carving is hard to understand. The toy vaults, the graceful tracery, the tiny crocketed finials are beautifully cut. A vine which runs through part of the ornamentation has charming little leaves, and bunches of grapes no larger than a franc piece. As the fragments are found they are laid out in the near-by chapels, where a patient man is working day in and day out trying to put this Humpty-Dumpty together again.

Next the nave will be closed off, to become a workshop, and the slow work of restoration will begin. How long it will take not even M. Deneux can say. That will depend on the credits and the number of workmen the government can spare and upon the success of the Société des Amis de la Cathédrale de Reims, newly founded under the patronage of President Poincaré and Cardinal Luçon, in soliciting voluntary contributions. But it can hardly be less than fifteen or twenty years.

Housing Shortage and Health

A SCARCITY of housing facilities directly tends to lower quality and to induce cheap and undesirable substitutes. And these affect the social life, comfort, and health of the family. It may not have occurred to the average person, but it is true, that there are housing substitutes as there are substitutes for food, leather, and clothing. Among the substitutes for proper and adequate housing may be mentioned tents, shacks, and house-boats, and not forgetting, either, the doubling-up evil, which means the housing of two or more families where space, light, air, and sanitary provisions are wholly inadequate.

Housing shortage also tends to lower housing standards, and unless watched carefully permanent deterioration in the character, comfort, and safety of home dwellings will follow.

All this is prefatory to the statement that at the present time the shortage of houses is so wide-spread and so evenly distributed over the whole country that the really alarming character of the situation is not, it is feared, generally recognized or understood. In this connection, and giving almost at a glance the housing situation, the following statistics compiled by Mr. Wharton Clay, showing the proportion of families to dwelling-houses for the last thirty years, tell a most significant story. While the figures from 1890 to 1920 are well worth study, for the purposes of this article those from 1916 on must suffice. Here they are:

In 1916 there were 20,263,051 dwellings for 23,292,887 families; in 1917, 20,672,051 dwellings for 23,799,275 families; in 1918, 20,808,562 dwellings for 24,305,662 families; in 1919, 20,829,039 dwellings for 24,872,051 families, and for the year 1920 the proportions are 20,900,000 dwellings for 25,319,443 families. This means an existing shortage of 4,419,443 houses for family dwellings, and on a basis of five members to a family, 22,097,215 persons in this country to-day are not being properly or adequately housed.

According to the editor of *American Building Association News*, who has charted by years the housing situation in this country, the shortage in housing facilities has shown a sharp and decided upward swing since 1917. He also is authority for the statement that in 1918 only 20,000 new houses were built when there should have been twenty times that number. Last year showed some improvement with a little over 70,000 houses completed, according to the estimates of the U. S. Building Corporation. This slight increase in building has by no means kept pace with the increase of population, which is far ahead of any building programme, until now it is estimated that for every 100 existing houses there are at least 121 families to be provided for.

A situation like this means but one thing and that is acute congestion, which is certain to have a direct and unfavorable influence on both the health and morals of family life. In order to meet this evident and wide-spread shortage, the authority already quoted estimated that at least 2,139,000 homes must be constructed by or before 1926. And even this programme will not insure a return to pre-war conditions by any means. To bring this about 3,340,000 dwellings will have to be built during the period named. This would mean that in a town of 25,000 people 150 homes must be built every year for five years; and, of course, in like proportion for cities of larger size. That this housing situation as revealed by the facts and figures given has an important bearing on community life and health is quite apparent. It in fact constitutes a serious and ever-present menace to the public health and safety even under normal disease conditions. But in the event of outbreaks of any of the more dangerous types of communicable diseases, this menace then would be greatly increased both as affecting sickness and death rates and in more than doubling the work of health authorities in their efforts to bring and to keep such outbreaks under control.

The Alvin T. Fuller House

Robert C. Coit, Architect

AMONG the fine residences that line the shore drive which links the old historic city of Newburyport with its New Hampshire neighbor, Portsmouth, there is no more interesting summer home than that of Hon. Alvin T. Fuller, at Little Boars Head.

It stands back from the main road, only the high-road lying between its wide sweeping lawns and the sea.

The house which stands the central feature of the home grounds is an effective combination of white paint and red brick. This contrasts charmingly with the green lawn and the darker green of the dwarf evergreens which are massed, not only against the terrace, but around the house. The planting is formal, for, owing to the exposed location, evergreens have been utilized to a great extent, as they endure the severe winter much more successfully than do less hardy shrubs and plants.

The sun-room with brick wall and tile floor.

At the left a charming pergola curves to follow the line of the boundary wall. Beyond the pergola the graceful curve of the wall is defined by rows of specimen spruce-trees.

Still another ornament to the grounds is an old well with carved stone base showing quaint figures. Above is a canopy of wrought iron and the whole is set in a border of day-lilies, surrounded by a circular bed planted in sections with geometrical precision, producing a desired color effect.

The grounds, attractive as they are, however, are only the fitting and worthy adjuncts of such a house as this. Mr. Robert C. Coit, of Boston, the architect, has designed a house to fit cleverly into the landscape. An especially interesting feature is the porch at the motor entrance which is supported by unusually beautiful columns and flanked by pyramidal evergreens in painted tubs. The picturesque feature is the gable that appears like the end of an old-time house with Dutch lean-to roof, over which the main body of the house is superimposed. The effect of the larger and more pretentious house so artfully concealing the quaint old-fashioned small one is very unusual and delightful.

Everywhere is found excellent treatment of details. The leader pipes are ornamental and the blinds, with their cut-out crescent motifs and unique "S" hinges, are also good. But perhaps the novel feature of this side of the house is the variety of windows that are used and their arrangement. Windows of various sizes are introduced wherever it is necessary or convenient. A group of three windows in the circular tower indicates the ascent of the stairway within, while another group of four windows affords light at the summit of this stair-tower, where it breaks through the roof. Other odd windows are placed in this tower. The lines of the steeply pitched roof have been broken by single and grouped dormer-windows, which let in an abundance of sunshine and air. An open-air sleeping-porch has no windows at all, but there are attractive white lattices which are sufficient to soften any effect of bareness which would otherwise be felt.

In the sun-room, which is in the brick gable, the apertures are charmingly curved at the top with fanlight effects, while the casement windows, like all the others, are composed of small panes above and a single large one below.

At the right of the hallway, before one enters the living-room, is the master's den.

From the master's room we may pass on directly into the large living-room, which occupies the whole of the length and a goodly portion of the width of the main body of the house. Opening on the one side into the sun-room in one of the wings, and on the other into the dining-room in the opposite gable, it affords pleasing vistas which give added homelike effect.

The sun-room, in the right wing, has walls of faded old brick, and the windows are unshaded save for the odd-figured oddly colored linen hangings which frame the casements.

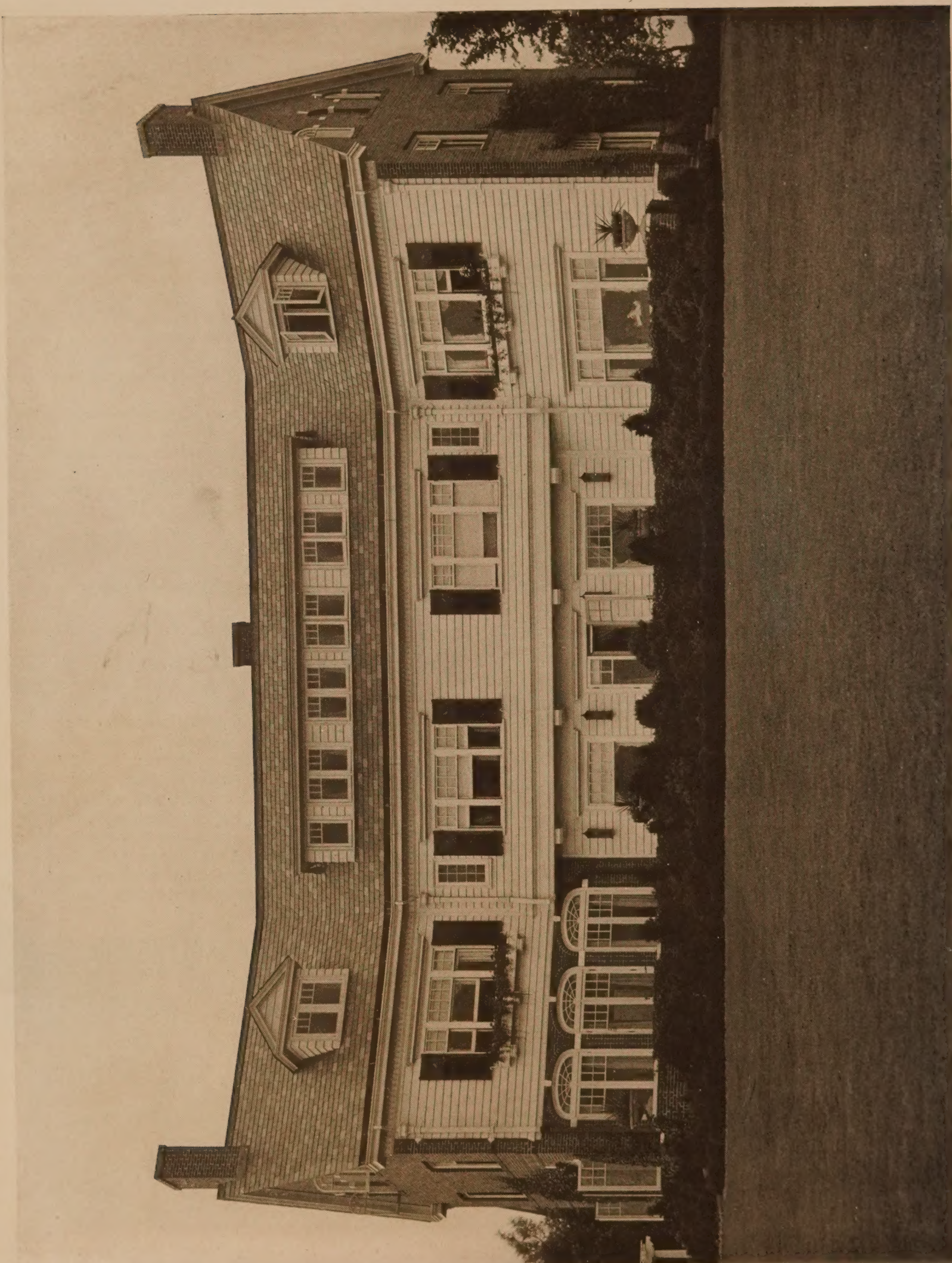
The rooms on the second floor are interesting in their way as the rooms on the lower floor.

The nursery on this floor, for two little girls, is an ideal room of its kind. White furniture with cane insets and dainty floral decoration could not be improved upon, while the screen to match, with its bluebird decoration, the quaint Brownie andirons and Bunny door-stop, provide articles of never-failing interest to the child.

Similarly located, but on the third floor, is the baby's nursery. Here the walls are covered with a blue figured paper, while the big braided rugs on the floor show a predominance of the same color.

Attic or third-floor rooms are always interesting, and the master's room, in the opposite wing from his young son's, shows that quiet taste combined with practical comfort.

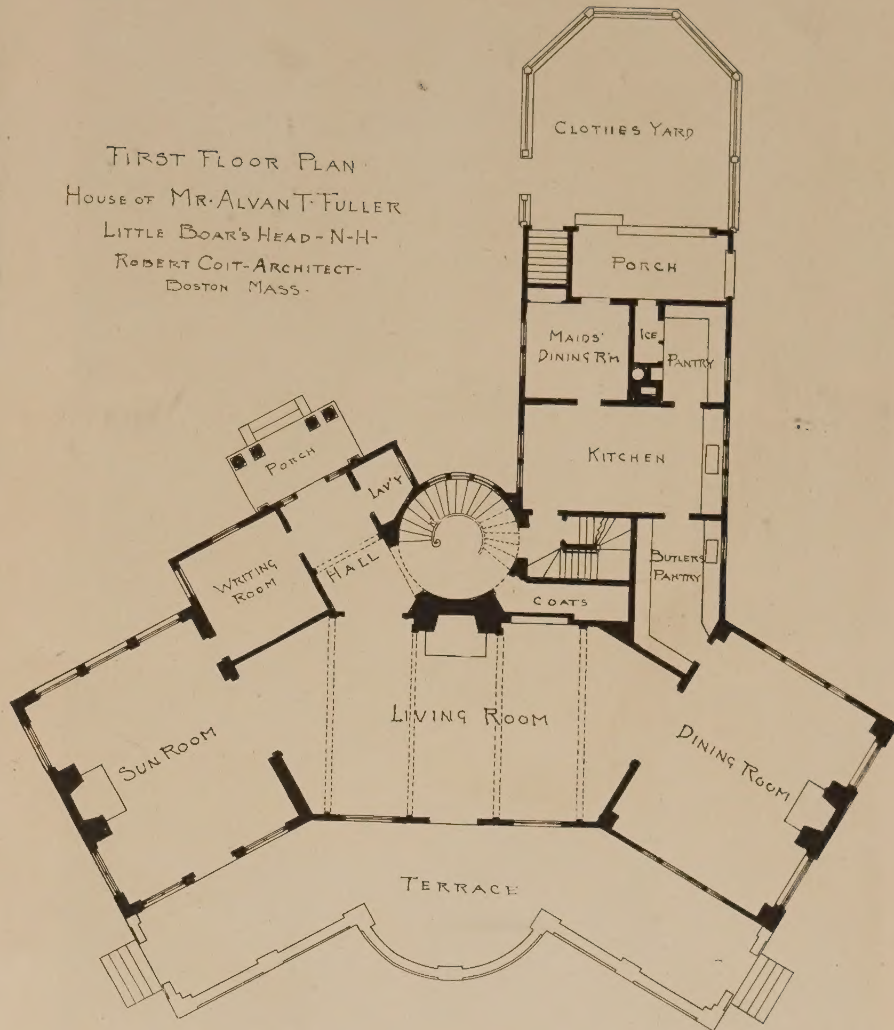
The dining-room.



RESIDENCE, ALVIN T. FULLER, LITTLE BOARS HEAD, N. H.

Robert C. Coit, Architect.

THE CIRCULAR STAIRWAY AND HALL.



RESIDENCE, ALVIN T. FULLER, LITTLE BOARS HEAD, N. H.

Robert C. Coit, Architect.

PORCH AND ENTRANCE TO HALL.

TERRACE AT THE BRICK END OF HOUSE.

RESIDENCE, ALVIN T. FULLER, LITTLE BOARS HEAD, N. H.

Robert C. Coit, Architect.

Book Review

THE ENGLISH INTERIOR. A REVIEW OF THE COURSE OF HOUSE DECORATION FROM TUDOR TIMES TO THE END OF THE XVIIITH CENTURY. By ARTHUR STRATTON, Architect. Containing Upwards of 100 Full-page Plates, Presenting Many Illustrations Printed in Collotype, Including a Series of Measured Drawings, and Numerous Illustrations in the Text from Photographs, Sketches, Drawings, and Engravings. Large quarto. New York: Charles Scribner's Sons.

There is stately dignity in the size and beauty of this handsome volume in keeping with the subject. Through its pages you enter the great as well as many of the minor homes of old England, and follow in text and illustrations the development of English social manners and customs, in the environment of architecture and the allied arts that were developed in the various periods discussed.

In early Tudor times the Englishman's home was indeed his castle, and massive walls and dungeon-like towers and a great central hall, where family and servitors might dine in common, were features of the times. In the centre of the hall was the fire, and the smoke found its way out through the roof. This was the period of the huge timber roofs, when the massive oak beams served both a utilitarian and a decorative purpose.

Various structural features were used as decoration, and tapestried walls, moulded ceilings, and great fireplaces marked the best Tudor structures.

In the days of Elizabeth began a more exuberant manifestation, and architecture, no longer influenced by the need for defensive structures, became freer and more ornate. Walls were beautifully panelled, chimney-pieces elaborately carved, ceilings covered with plaster ornament, and windows filled with leaded patterns on colored glass.

Under the Stuarts foreign influences began to be much in evidence.

It was Inigo Jones who first started English architecture in new ways, brought the classic traditions and the spell of Italian art to bear upon both exterior and interior, and his great successor, Sir Christopher Wren, nobly carried on the good work thus begun.

The Georgian Period Mr. Stratton calls "the most clearly defined and homogeneous period in our architecture"; certainly it was a period of great richness and variety, of affectations of the classic, of the reign of the cultivated amateur—a period of elegance, of building for the purpose of social occasions, of a sacrifice of the elements of home comfort to halls and salons in which to display beautiful clothes and carefully trained manners.

What were the principal features of English interiors, considered in detail? We ask the question because the author has so admirably answered it in Part IV of this volume, where he takes up such details as Wall Treatment, Decorations in Color, Ceilings of Wood and Plaster, Fireplaces and Chimney Pieces, Doors and Doorways, Staircases.

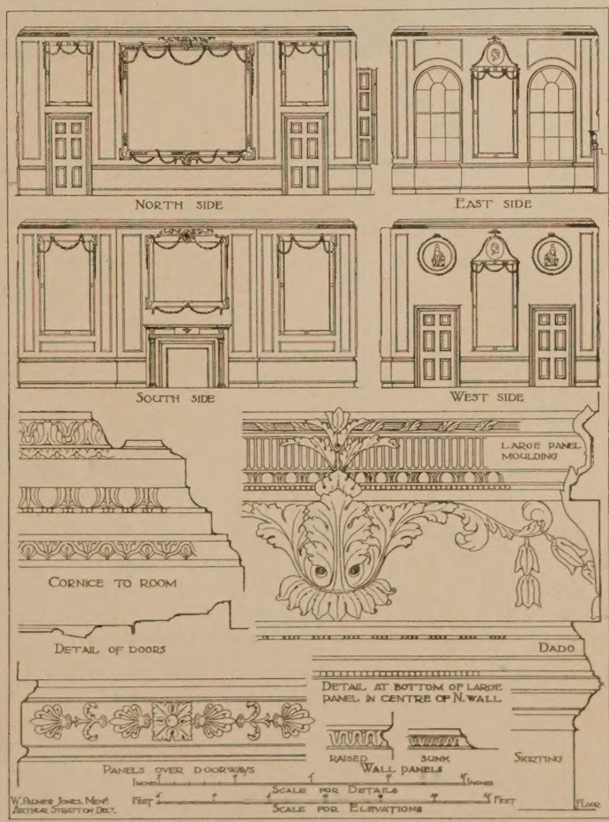
All of the famous designers and architects are represented—Inigo Jones, John Webb, Sir Christopher Wren, Sir J. Van Brugh, Gibbs, William Kent, Isaac Ware, Robert and James Adam, and others. The comprehensiveness of the many illustrations in the text, and the splendid full-page plates make the volume a complete reference of incalculable value to every architect or specialist in interior decoration.

The following is a condensed contents, showing the great scope of the book: Section I. INTERIORS OF THE TUDOR AND EARLY STUART PERIODS.—Significance of the Interior. The Beginnings of English Interior Decoration. Characteristics of the Early Tudor Type. Exuberance of Elizabethan and Jacobean Rooms. Early Interior Planning. Section II. LATER STUART AND EARLY GEORGIAN INTERIORS.—The Renaissance Wave and Transitional Decoration. Inigo Jones and his Influence. Wren, Gibbons, and the Craftsmen of the Period. Eclipse of the Stuart Type and Gradual Evolution of the Georgian Interior. Section III. INTERIORS OF THE TIME OF THE LATER GEORGES.—Characteristics of the Georgian Period: Its People and their Houses. Splendid Georgian Salons. English Rococo Decoration. Reaction to the Delicacy and Simplicity of the Brothers Adam. The Empire Style and the Victorian Decadence. Section IV. THE CHIEF FEATURES OF INTERIOR DESIGN AND THEIR TREATMENT.—Wall Decoration. Ceilings. Fireplaces and Chimney Pieces. Doors and Doorways. Staircases. Section V. SERIES OF UPWARDS OF 100 PLATES ILLUSTRATING THE PROGRESS OF ENGLISH INTERIOR DECORATION.

The senate of the University of London have recently conferred the title of Reader in Architecture upon Mr. Stratton, F.S.A., F.R.I., B.A. For some years he has held the post of Lecturer in the School of Architecture at University College, and his new appointment is tenable at the same college.

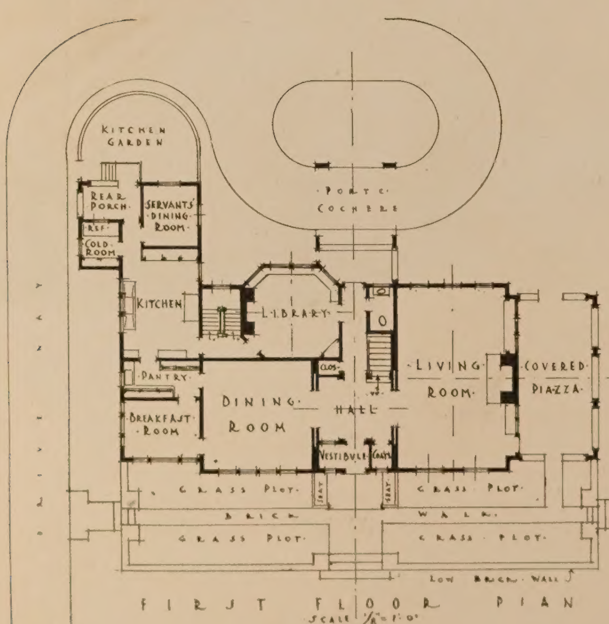
Mr. Stratton's other literary work is well known. Some years ago he published an interesting monograph on Sir Christopher Wren. Later he completed the monumental work on "Tudor Architecture in England," commenced by the late Thomas Garner, and he also edited the most recent edition of Anderson's "Architecture of the Renaissance in Italy."

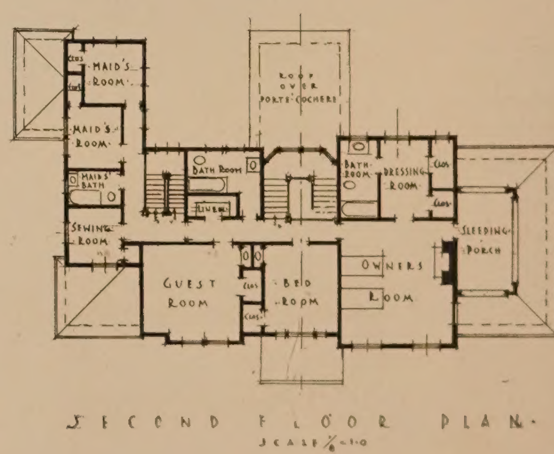
Plate CIV



ELY HOUSE, DOVER STREET, LONDON.
DETAILS OF THE DINING ROOM.

Great Dixter, Northam Sussex. The great hall.





HOUSE, WINTHROP WITHINGTON, JACKSON, MICH.

Leonard H. Field, Jr., Architect.

Editorial and Other Comment

Working Together for Better Conditions

TO preach an optimism we can't practise is an affront to our readers, an open challenge of our sincerity and understanding of actual conditions, but if we cannot with candor predict good times in sight, we may at least unite in the old Spartan virtue of making the very best of bad conditions. We have had plenty of time to realize that conditions are quite beyond the solving of the individual, and that we are in a tide of affairs that no ordinary resistance will stem, and that we can only turn on our backs and float, waiting for a favorable current to bring us safely to land.

It is mighty hard to accept our failures and recognize the fact that the old ways of doing business, old standards of living, old standards of morals, have gone, that we must adjust ourselves to something entirely new. We do a lot of talking, use a lot of words that bear a strong accent of condemnation, use up a lot of vitality in useless kicking, and settle down to a more or less placid resignation.

What is the use! We are helpless, so let us just stand and wait while the world goes on, while the profiteers grab the plums, and the congestion of population, due to the housing shortage, becomes a dangerous national menace, a disintegrating power in everything that makes for progress and the restoration of normal conditions.

We are told that at the bottom of trouble in the building trades is primarily the lack of adequate transportation, shortage of cars, of all kinds of rolling-stock, and yet some of us can't help wondering why it is that we pass so many empty cars on sidings everywhere and see so many loaded ones waiting days to be discharged. The other day we saw several hundred cars, representing railroads all over the country, empty, and we wondered if they were not lost and forgotten, and waiting for some friendly railroad man to wake up and start them loaded on a journey toward home. No doubt the gigantic problem of resystematizing our railroads will take a lot of time (years, we hope not), and we must be as patient as our training will permit. But there does seem to be a lot of waste motion, and to pass a train of empty freight-cars now and then, makes us wonder why they are not loaded and put to some use on their return journey. Surely there are plenty of things to be carried, coming and going.

We are inclined to believe that the war, while no doubt the leading factor in bringing real conditions to a climax, and making manifest a general condition of unpreparedness, is by no means to be blamed for all our ills. We have grown tremendously in the past twenty years, and the war taught us, as nothing else could, how little we had appreciated the growth of our population and the wide-spreading influence on our social and industrial life of great masses of unassimilated and un-Americanized aliens. It has been this element that has been largely responsible for the disorganization and instability of industries identified with the housing problem.

The trail of the profiteer, too, leads through all things, and materials for home-building are diverted into channels where the profits are greater and the return on the investment more immediate.

Maybe we can only sit tight and wait, and in the meantime pull together in the determination to find a practicable way of better equalizing the distribution of both materials and labor. None of the professions have felt the stress of the times more keenly than the architects as a body, and many of them have been compelled to turn their experience and energy temporarily into other fields. There is no going back to pre-war conditions, but there must be a way devised for meeting the new conditions, of making it possible for the architect to obtain supplies for the hundreds of minor buildings so grievously needed everywhere. The big things will take care of themselves, if permitted, but the building of homes for people of modest means is more vital than any other form of present-day building, and the architects must stand as one demanding that the problem receive first consideration.

New York's Housing Problem

THE housing problem in New York probably is typical of conditions generally, so that some of the proposed relief measures in that city should be of interest and value everywhere. That this problem is beyond solution by any single group of men has become obvious, and that a broader view than is possible under ordinary business conditions will be necessary is also very evident.

There can be no effective arguments or plans based on other than on strictly business results, of course. Capital in these days demands and receives a reward commensurate with increased costs. Senator Calder has made the following proposals:

"(1) The exemption of mortgages up to the sum of from \$40,000 to \$50,000 from the provisions of the State and federal income tax;

"(2) The exemption from all federal and State income tax for a period of ten years of all profits of builders while engaged in actual construction, providing these profits are invested in the construction of new dwellings;

"(3) The exemption from the federal income tax of mortgages on all new dwellings, regardless of the amount; and,

"(4) The creation of a commission to modify the building code of the City of New York, removing the restrictions and difficulties in the way of construction of cheap houses."

Senator Calder also suggested an inquiry into prices to

determine whether or not building material manufacturers are combining into groups to raise prices.

The lack of building is attributable to many causes, chiefly to a shortage of materials, transportation, and the high price of labor.

Measures to remedy the situation by tax exemption, according to an editorial in the *New York Evening Post*, will "greatly puzzle those at both ends of the range of opinions: those who attribute all housing troubles to the cussedness of house owners, on the one extreme, and those who advocate the single tax, at the other. Single-taxers will fail to see why some improved property should pay and other be exempted. Those who have it in for tenement owners in general will rage at the idea of exempting any of them.

"Actually the drawbacks to exempting new houses from tax extend further than at first appears. A writer in *The Sun and New York Herald* calculates that the tax exemption on new tenements will amount to some $40,000,000. If all the housing required shall be built, and shall obtain tax immunity, it may well come to some such great figure. But the State and local governments will need a corresponding sum in order to take care of the added property and inhabited area.

"From where, then, shall the money come? Perhaps some genius could devise a new form of taxation to provide it. More likely it will come from an increase in the rates of the present realty tax—the obvious proceeding. But to tax some property in order to exempt other property, to tax one tenement owner in order to exempt his neighbor, to tax old buildings already heavily burdened with up-keep in order to exempt new ones, would savor of unfairness. It would at the same time raise, by the amount of the added tax, the cost of the least desirable living quarters, which by the rule of marginal utility sets the price for the rest."

Building Costs

NO doubt there are many clients, or possible clients, who look upon the architect's estimates of probable building costs with more or less suspicion, classing him with the general run of profiteers. It is hard to convince a would-be home-builder that the architect, like himself, is simply the victim of conditions.

The increase in the percentage of cost of building materials from 3 per cent in 1915 to 140 per cent in 1920, with labor costs varying in their increase from 60 to 300 per cent, is the answer.

A War Memorial for California to be a Home of the Fine Arts

From an address by Willis Polk to the Faculty and Students of the California School of Fine Arts

ALL have heard the old story of the bully who disputed the sidewalk in Jamestown with George Washington. The bully said: "I never get out of the way of a blackguard." George Washington, with his best smile and in his most amiable manner, politely stepping aside, replied with a gracious wave of the hand: "I always do."

It was said that we were too proud to fight, but we did!

We entered the war to make the world free for Democracy. Up to date it appears that the war has only made part of the world free for Bolshevism. But have no fear, the war has made several million Americans sit up and take notice. There will be no Soviet Bolshevism, no autocratic rule, in this country, the spirit of Democracy will not perish from the earth—the American Legion will attend to that.

The American Legion is going to build in San Francisco a monumental group of buildings in memory of the men and women—soldiers, sailors, and civilians—who died that Democracy might live. This group of buildings to commemorate the victory of Democracy will be a nurturing place for all the highest ideals of a free people. It will be a home of the Fine Arts—painting, poetry, sculpture, music, and architecture. It will be a fitting temple for those ideals for which we waged the war!

The faculty and students of the California School of Fine Arts and their successors will find in this memorial a home and be provided with facilities for study. Will they be worthy of it? This year your student body was awarded 6 out of 10 of all the honors available to art students throughout the country. Next year you ought to get 7 out of 10. The year after 8 out of 10, and thereafter 10 out of 10, for California is really and truly the true home of real art.

In the War Memorial, the Art Association will have its galleries, the school its ateliers. Students from all the world will, in time, seek this school for instruction rather than will our students go forth for enlightenment. That is, if nature, temperament, and determination are no less strong with us than were these characteristics with the Egyptians, Greeks, Italians, and other predecessors of present-day ideals of civilization, order, and art.

As far as the students, and the faculty, too, for that matter, are concerned, it must be remembered that success in any vocation means patient, unending plodding. There is no short cut to success. Impressionist, cubist fads are entertaining, but usually are uninstructive and detrimental to healthy artistic development. The students must study the methods of the old masters, not to copy them, but to seek inspiration.

Michelangelo, Rubens, Rembrandt, Raphael, Leonardo, Velasquez—all the masters—were artisans as well as artists. Their work was complete in the last detail.

Can you match the incomparable finish of the "Winged Victory of Samothrace," or the immortal sculptures of Phidias, with the works of Rodin! I say no, a thousand times no!

The Lumberman's Attitude Toward a Forest Policy

PUBLIC-SPIRITED lumbermen are not opposed to a forest policy. They recognize that both national and industrial welfare demand early development of an American forest policy which shall substitute for indifference and accident an intelligent, practical, equitable, and concerted programme for the perpetuation of the forests:

The lumbermen believe—

That growing future timber crops must be largely, though by no means wholly, a government and State function;

That government and States should be permitted to condemn any deforested land classified as suitable chiefly for forest-growing, and pay for it at prices comparable to those paid in voluntary transactions.

That land classification and studies should be undertaken jointly by industry, States, and government.

That the Forest Service should be the recognized leader of public forestry thought and effort along general lines.

That wise conservation requires the determination of better methods of waste prevention and of utilization of the forests we already have.

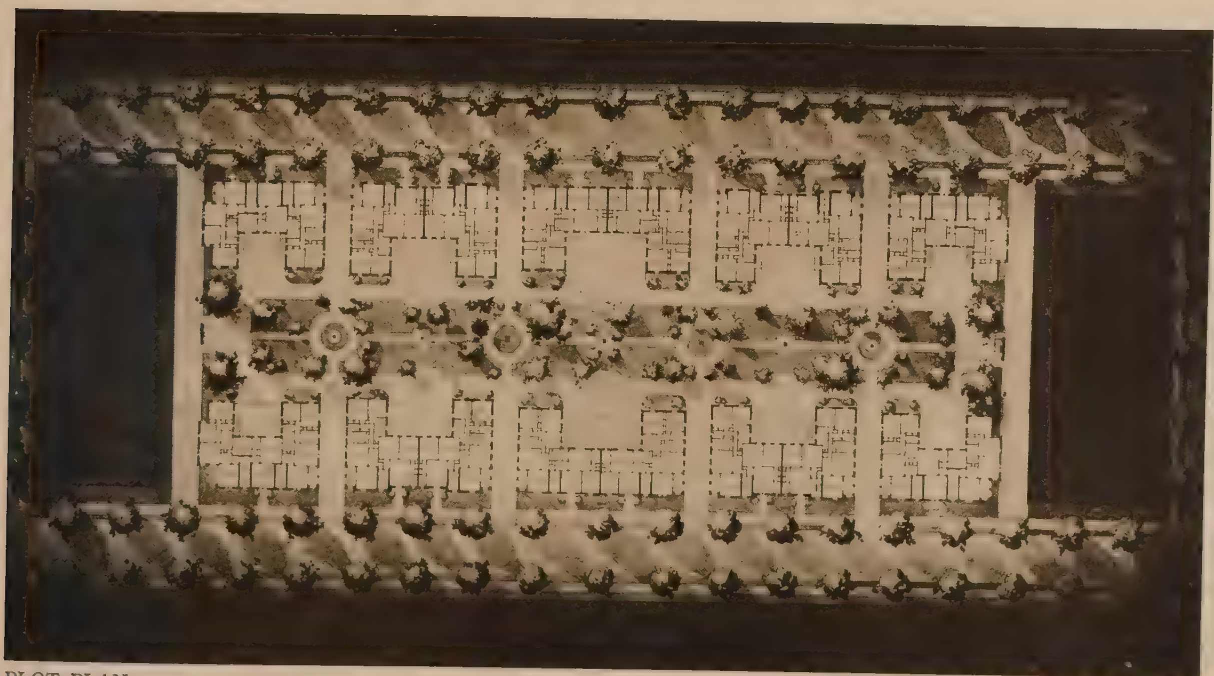
That a successful forest policy means much more than tree-growing. It means confidence and security in every legal and commercial phase, to industry and public alike.

ENTRANCE DETAIL.

Andrew J. Thomas, Architect.

GARDEN APARTMENT BUILDINGS FOR THE QUEENSBORO CORP., JACKSON HEIGHTS, QUEENS, NEW YORK.

THE GARDENS.

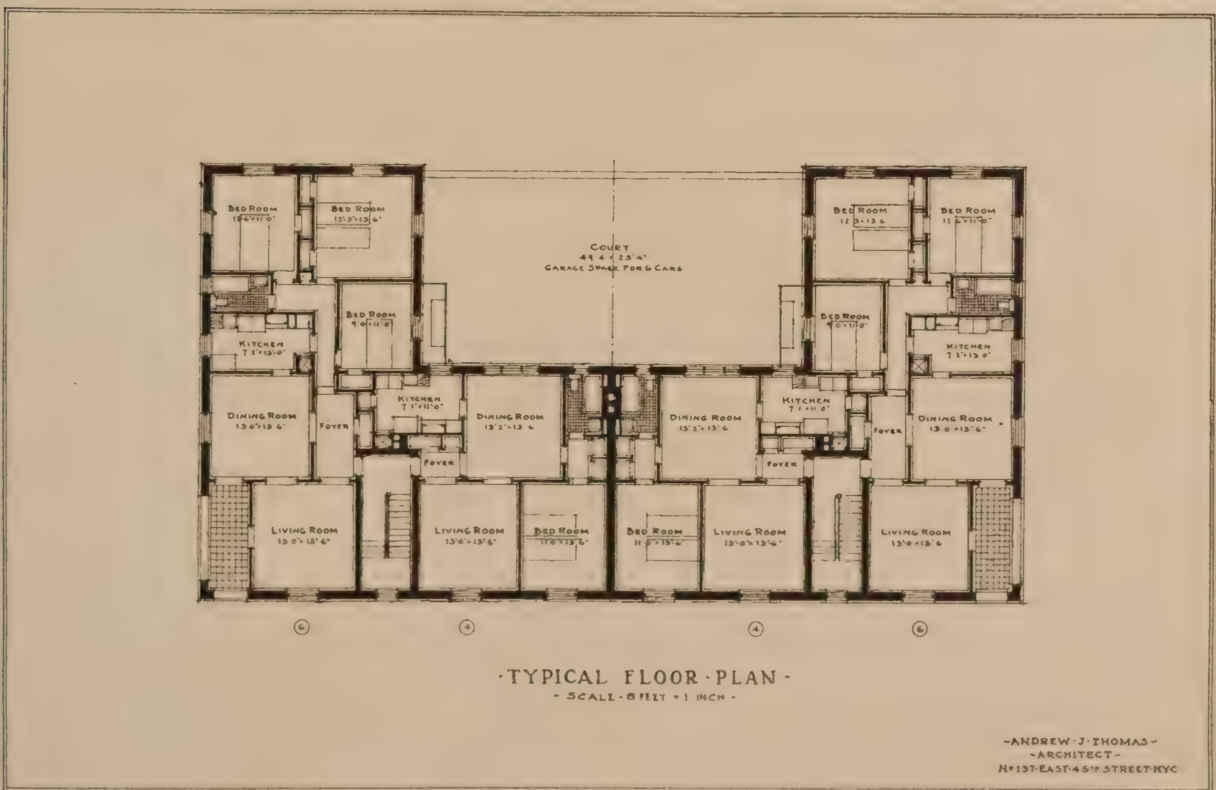


PLOT PLAN.

Andrew J. Thomas, Architect.

GARDEN APARTMENT BUILDINGS FOR THE QUEENSBORO CORP., JACKSON HEIGHTS, QUEENS, NEW YORK.

FRONT ELEVATION.



CENTRAL UNIT. Andrew J. Thomas, Architect.

GARDEN APARTMENT BUILDINGS FOR THE QUEENSBORO CORP., JACKSON HEIGHTS, QUEENS, NEW YORK.

HOUSE, C. C. MERRITT, LARCHMONT, N. Y.

Sterner & Wolfe, Architects.

REAR.

DETAIL.

HOUSE, C. C. MERRITT, LARCHMONT, N. Y.

Sterner & Wolfe, Architects.

LIVING-ROOM.

HOUSE, C. C. MERRITT, LARCHMONT, N. Y.

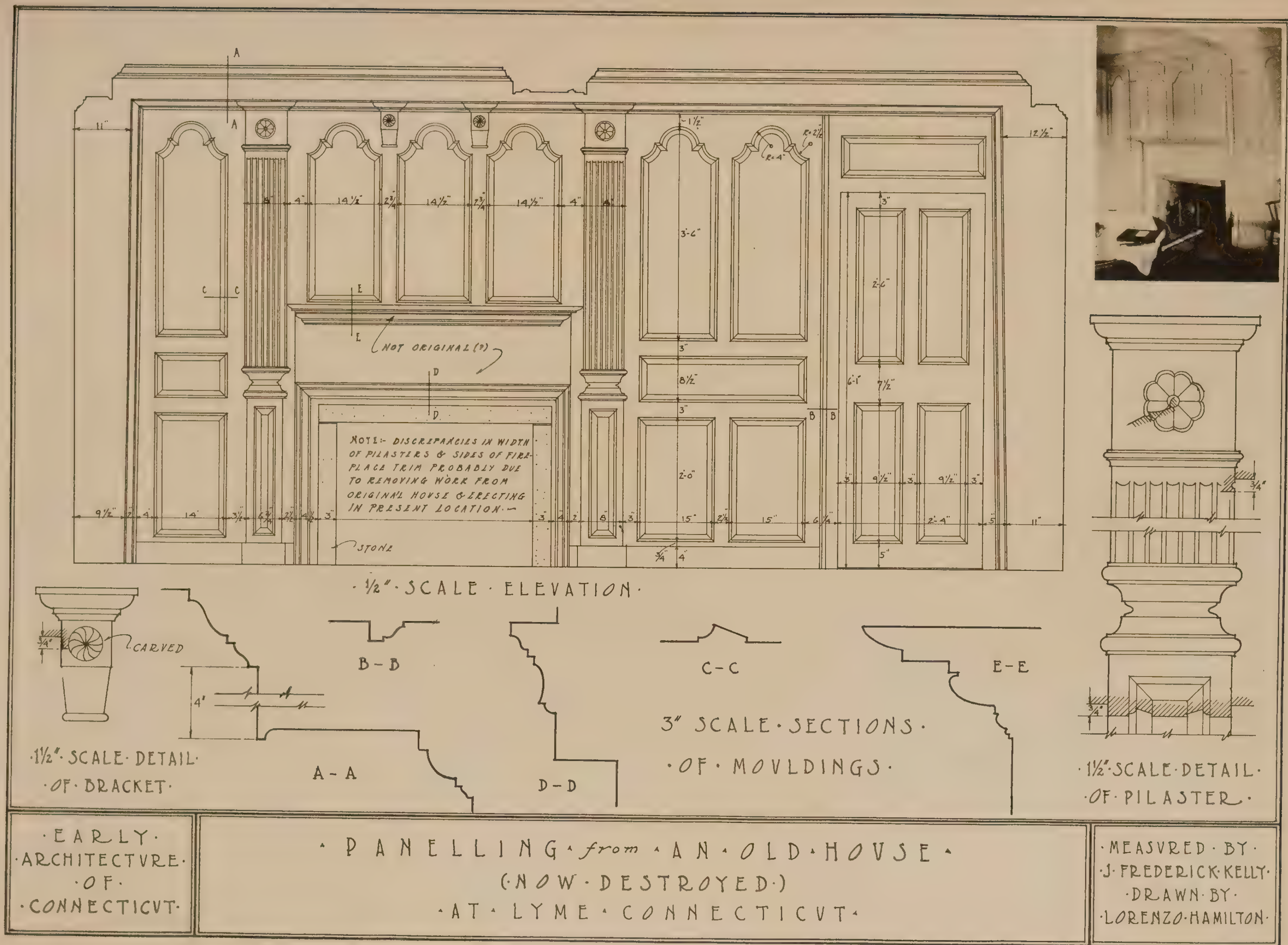
Sterner & Wolfe, Architects.

DINING-ROOM.

PLANS.

Sterner & Wolfe, Architects.

HOUSE, C. C. MERRITT, LARCHMONT, N. Y.


NOT ORIGINAL (?)
NOTE:- DISCREPANCIES IN WIDTH OF PILASTERS & SIDES OF FIRE-PLACE TRIM PROBABLY DUE TO REMOVING WORK FROM ORIGINAL HOUSE & ERECTING IN PRESENT LOCATION.—
STONE
· ½" · SCALE · ELEVATION ·
CARVED
·1½"· SCALE · DETAIL · OF · BRACKET ·
A – A
B – B
C – C
D – D
E – E
3" SCALE · SECTIONS · · OF · MOVLDINGS ·
· 1½" SCALE · DETAIL · · OF · PILASTER ·
· EARLY · ARCHITECTVRE · · OF · · CONNECTICVT ·
· PANELLING · from · AN · OLD · HOVSE ·
(· NOW · DESTROYED ·)
· AT · LYME · CONNECTICVT ·
· MEASVRED · BY · J · FREDERICK · KELLY · · DRAWN · BY · · LORENZO · HAMILTON ·

HOUSE, ANDREW J. THOMAS, SCARSDALE, N. Y.

Andrew J. Thomas, Architect.

LIVING-ROOM WING.

SERVICE AND GARDEN ENTRANCES.

Andrew J. Thomas, Architect.

HOUSE, ANDREW J. THOMAS, SCARSDALE, N. Y.

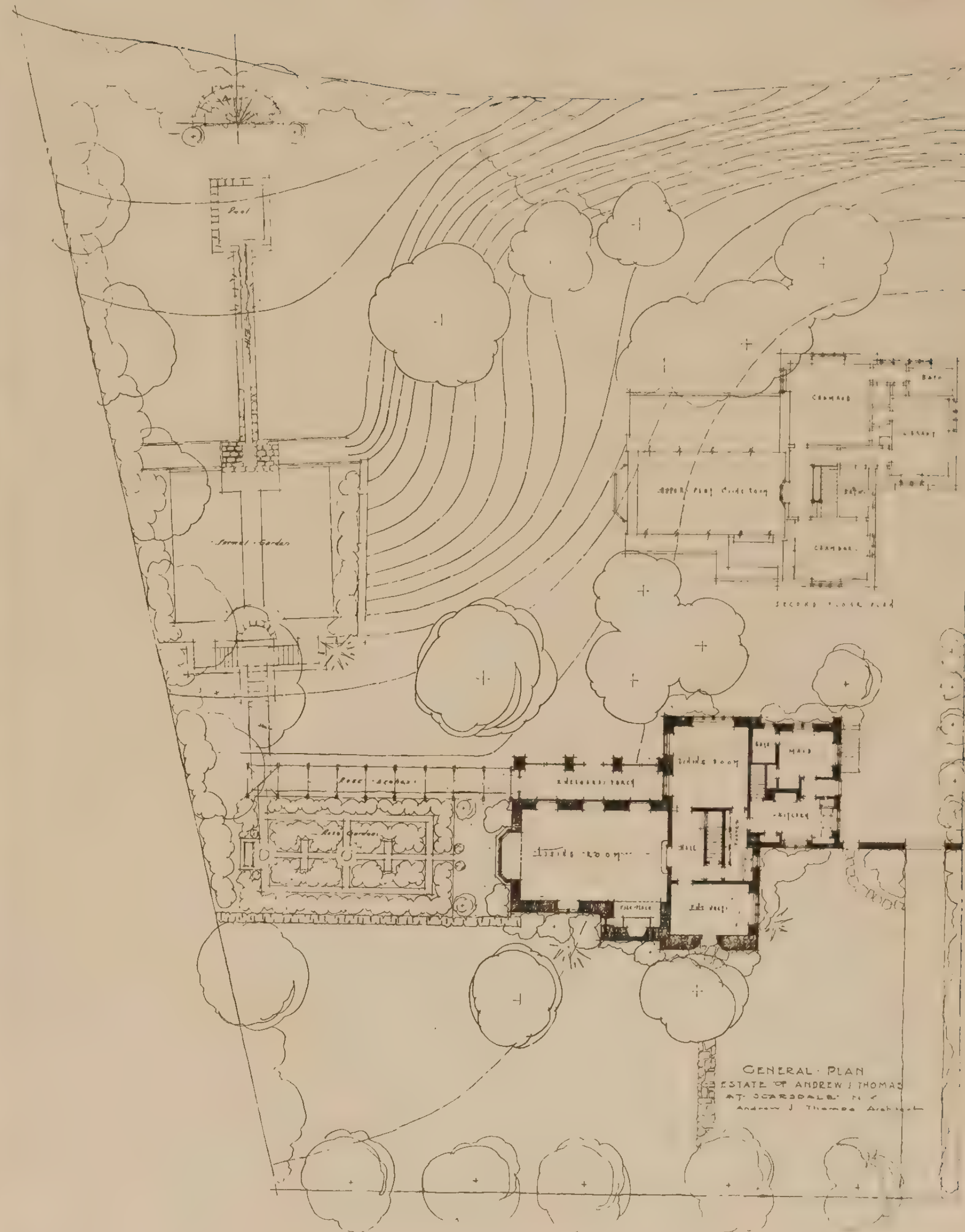
MAIN ENTRANCE.

POOL IN GARDEN.

Andrew J. Thomas, Architect.

HOUSE, ANDREW J. THOMAS, SCARSDALE, N. Y.

ENCLOSED PORCH.



Andrew J. Thomas, Architect.

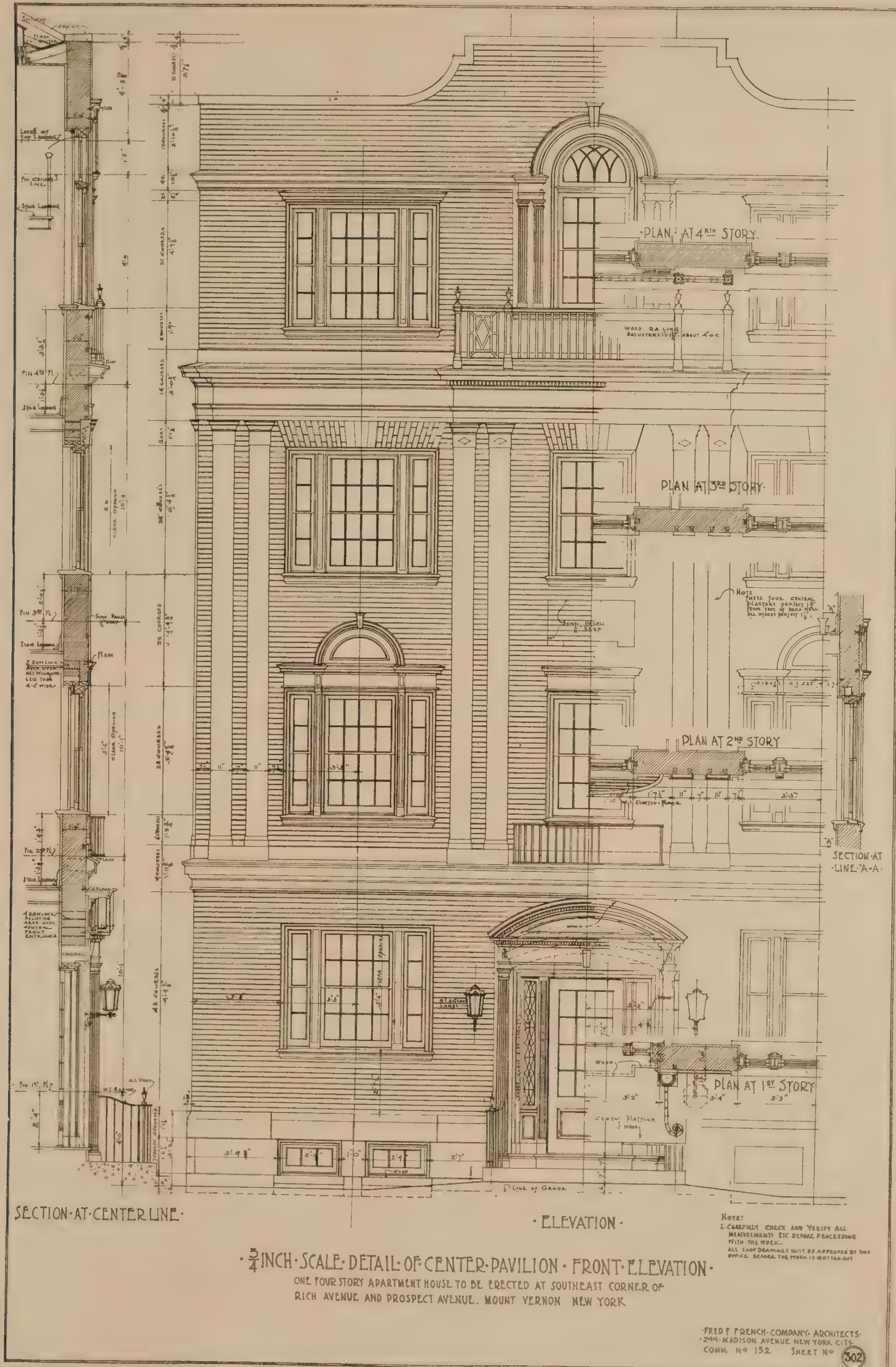
HOUSE, ANDREW J. THOMAS, SCARSDALE, N. Y.

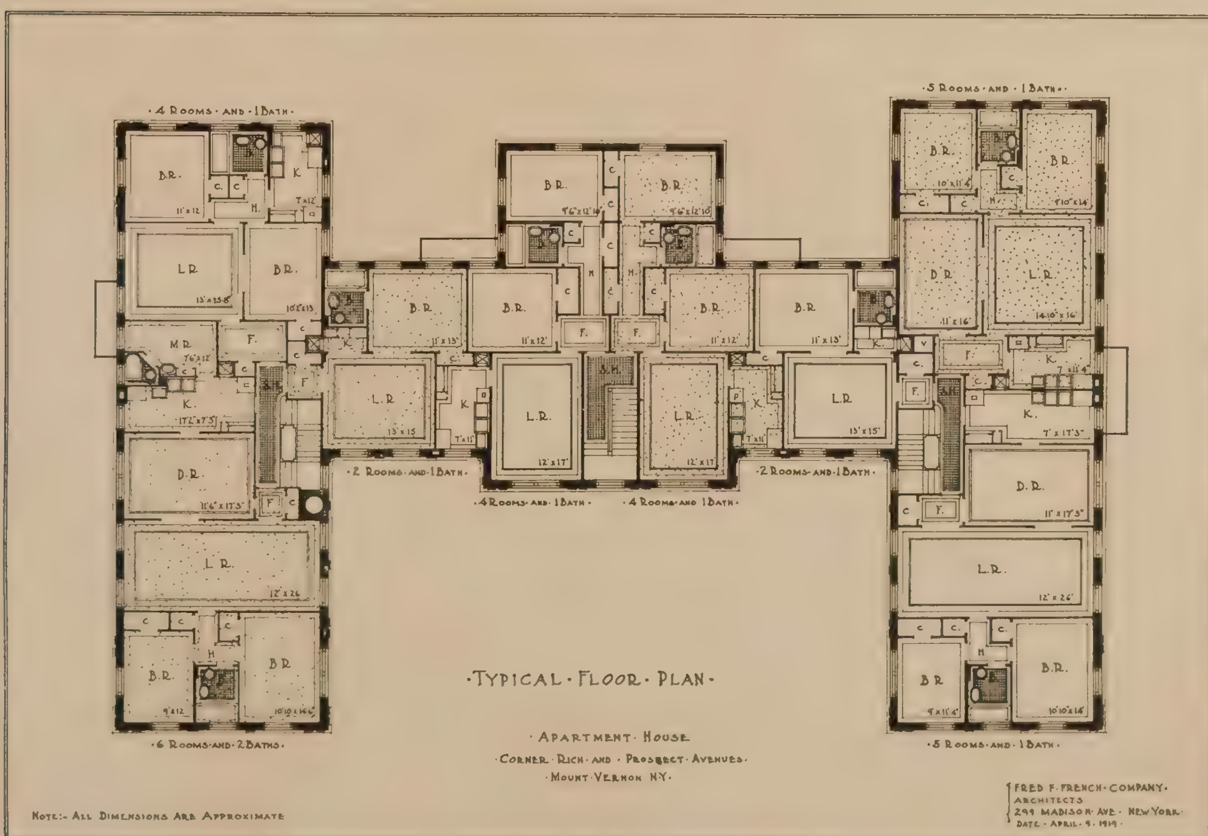
LIVING-ROOM.

Andrew J. Thomas, Architect.

HOUSE, ANDREW J. THOMAS, SCARSDALE, N. Y.

ENTRANCE DETAIL, APARTMENT HOUSE, RICH AVENUE, MT. VERNON, N. Y. Fred. F. French Co., Architects.


PLAN AT 4TH STORY
PLAN AT 3RD STORY
PLAN AT 2ND STORY
PLAN AT 1ST STORY
SECTION AT LINE A-A
SECTION AT CENTER LINE
ELEVATION
NOTE:
1. CAREFULLY CHECK AND VERIFY ALL MEASUREMENTS ETC BEFORE PROCEEDING WITH THE WORK.
ALL SHOP DRAWINGS MUST BE APPROVED BY THIS OFFICE BEFORE THE WORK IS GOTTEN OUT
3/4 INCH SCALE DETAIL OF CENTER PAVILION FRONT ELEVATION
ONE FOUR STORY APARTMENT HOUSE TO BE ERECTED AT SOUTHEAST CORNER OF RICH AVENUE AND PROSPECT AVENUE. MOUNT VERNON NEW YORK
FRED F FRENCH COMPANY ARCHITECTS
299 MADISON AVENUE NEW YORK CITY
COMM. NO 152 SHEET NO 302

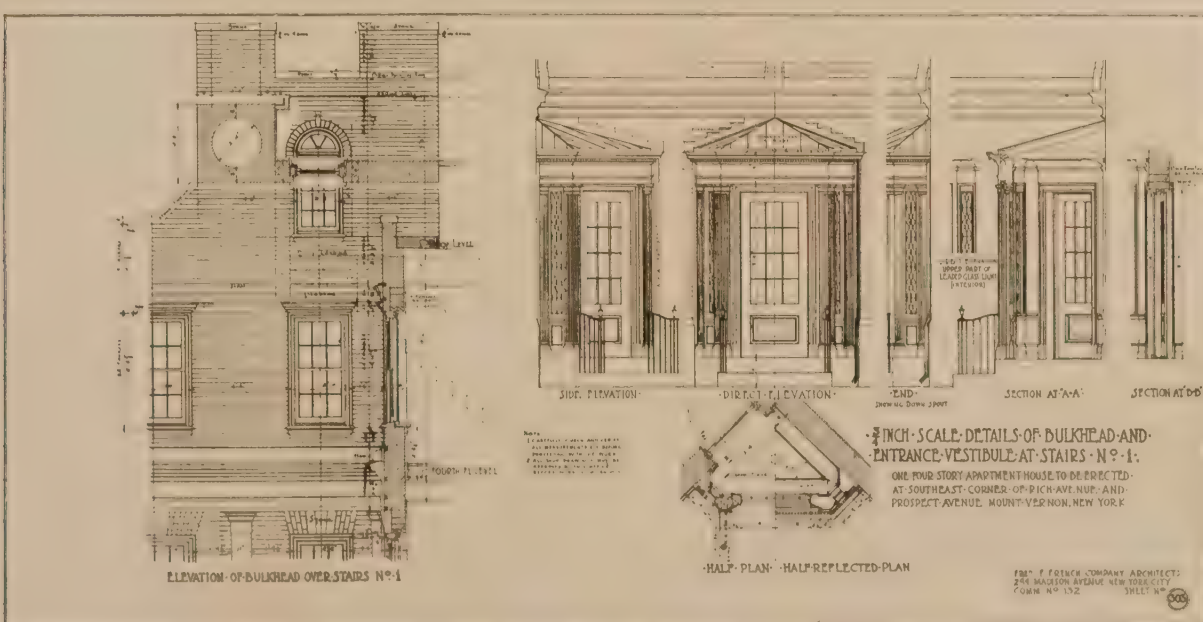

·4 ROOMS·AND·1 BATH·
·5 ROOMS·AND·1 BATH·
·2 ROOMS·AND·1 BATH·
·4 ROOMS·AND·1 BATH·
·4 ROOMS·AND·1 BATH·
·2 ROOMS·AND·1 BATH·
·6 ROOMS·AND·2 BATHS·
·5 ROOMS·AND·1 BATH·
·TYPICAL·FLOOR·PLAN·
·APARTMENT·HOUSE
·CORNER·RICH·AND·PROSPECT·AVENUES·
·MOUNT·VERNON N.Y.·
NOTE:- ALL DIMENSIONS ARE APPROXIMATE
FRED F. FRENCH·COMPANY·
ARCHITECTS
299 MADISON AVE·NEW YORK·
DATE·APRIL·9·1919·

Mount Vernon's First Large Apartment-House

THE Fred F. French Company drew the plans and constructed the thirty-two-family apartment-house of colonial design situated at the southeast corner of Rich and Prospect Avenues in the heart of Mount Vernon's best residential section. Macombs-Nelson, Inc., which is controlled by Charles L. Adams of New York and Mount Vernon, is the owner. The operation which was completed last fall was partially financed by the Mount Vernon Trust Company, who made the owners a conservative building and permanent loan. This is the first apartment building of this magnitude to be erected in Mount Vernon. There are three distinctive entrances and three separate public stairs, each serving two or three apartments to a floor. The entrances are set back from the curb about 75 feet, in addition to which ample grounds extend entirely around the building, which is built 130.6 feet on Rich Avenue and 84 feet on Prospect Avenue on a plot 175 feet x 112 feet.

The typical floor comprises two 2-room apartments, three 4-room apartments, two 5's and one 6.

In the larger suites a large living-room running through the entire wing, with windows at both ends, insuring cross ventilation, has been featured.



The Construction of the Small House

By H. Vandervoort Walsh

Instructor in Architecture, Columbia University School of Architecture

ARTICLE I

THE PRESENT-DAY ECONOMIC TROUBLES

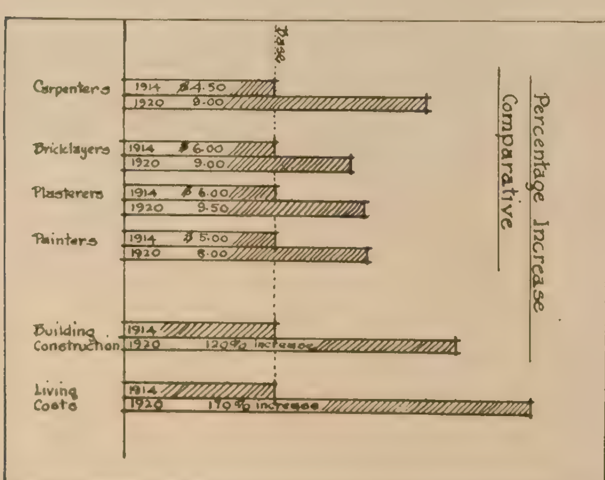
THE PROBLEM

THE designing of the small house is one of the most fascinating of all problems in architecture to the young man, and yet it is one of the most elusive, for economic forces seem to be very persistent in keeping the first-class architects from this field. Although in the next five years it will be necessary to construct about 3,300,000 new homes, if we expect to reduce the congestion of housing to a pre-war basis, yet the country seems to be about to face a famine of well-designed houses in filling this building programme.

The general conditions in the profession show that only the very wealthy clients carry out their schemes, while the vast majority of people with moderate means are turning to other channels for securing their homes. Mr. Average Citizen finds that the home he has been saving his money to build has flown from his hand, like a bird. The sketches and plans he had prepared for a nice little $10,000 home, now represent an investment of $20,000 or more. Once having calculated upon a building loan of 60% of the value of the house and lot, he now finds he can secure only about 40%, if he can manage to draw any money away from the great speculative schemes which have been so attractive during the last few years. In fact, if he expects to build at all, he must be reconciled to a small six or seven room house which will cost him $10,000 or more, or as much as the large house which he had planned originally to build. On account of the servant shortage this may not be so bad a proposition.

He brings his trouble to the architect in this manner: "But I can buy a house and lot at 'Heavenly Rest Real Estate Park' for that price, and on the instalment plan, too. I don't see why the cost of a house built from your plans should be so much greater than this." And the worst of it is, that the facts which he states are true.

A dwelling built from an architect's plans is more expensive, to-day, than the speculative house, for the very



reason that it is carefully planned and requires good materials and construction; but Mr. Average Citizen cannot see this difference, because he cannot understand the poor quality of materials and construction in the speculative house, nor has he been educated to appreciate the artistic difference. Moreover, the contractor who bids on the plans of an architect in these days of chaotic prices, plays well on the safe side. He estimates as near as he can to the actual costs and then adds a large per cent to cover the risk of possible increase in wages, materials, costs, and delays. If he built the same house for speculation, after it had been completed he would know the exact cost, and be safe in setting his selling price which in most cases could be lower than an estimate on the same house in plan form, since the element of risk has been removed.

To show to what exaggerations this danger of risk carries the estimates, a well-known architect in New York City had bids taken for a small, four-room and bath, frame, gate-house for a large estate on Long Island. This house was only 19′ x 28′, and was very plain. The lowest estimate was $11,000 which is about $1 per cubic foot. Now the chief reason for this excessive cost was that the plans and specifications of this architect were exact and binding, but the wages which the contractor had to figure on, and the cost of material were rising. Some will say that the contractors knew that the owner was wealthy, and that this was the cause, but if this was partly the motive, nevertheless the other was the prime motive, for there have been too many similar cases. Each contractor was afraid of his own estimate, and therefore played well on the safe side, yet, if they had built this small cottage themselves, they could have found its exact cost, and sold it cheaper than the bids which they turned in to the architect. In fact, cheap stock plans drawn by incompetent architects which have a minimum number of lines on them, and which are accompanied by brief specifications will bring in lower bids, because of the fact that they are not binding and the builder is permitted to "get away with things." Carefully drawn plans and accurate specifications are not desirable, if low bids are wanted, provided the owner does not care what kind of a house he gets.

Many architects have conscientiously tried to solve the cost problem by inventing cheaper methods of construction, but to little avail. The estimates come in just as high, because the average small contractor is afraid of any new innovations, since there is too great an element of risk, and he is very conservative. One of our leading architects developed a new system of partition construction for the small house which in materials and labor saved about 30% over the ordinary type, but when he first introduced it, the estimates were just as high as ever. As he was interested in seeing these partitions tried out, he endeavored to get the contractor to build them in this new way, and received the same high price as was charged for the older and more usual type. In fact the architect was showing the contractor how to make some money, but he was so conservative that he

A house of this type, before the war, could have been built for about $10,000.

would not do it. It is gratifying to know that at last the architect has built some of these partitions himself and found that they are exactly what he had estimated them to be.

SOME SOLUTIONS

In endeavoring to find the solution to these problems, which the young architect must face in this field of design if he wants to handle any of the small-house work of the next five years, a few suggestions have been collected which seem to have some practical merit.

1. First of all the architect must eliminate as far as he is able the large element of chance which the average contractor must take in making bids upon his plans. If he can reduce this to a minimum, then he will automatically reduce the bids. This has been successfully accomplished by having a written agreement with the various contractors who are competing, that, if they receive the contract, the owner will be responsible for and pay for any increase in labor or materials which may take place during the period of erection. Likewise the contractor is made to agree that the owner will benefit, if there is any reduction in the costs of labor or materials during the same period.

This simple understanding relieves the nervousness of the contractor who is bidding, while at the same time he is made aware of the fact that he is competing with other contractors on the same basis. Architects who have tried out this system of agreement have found that excessive estimates have been reduced to a minimum.

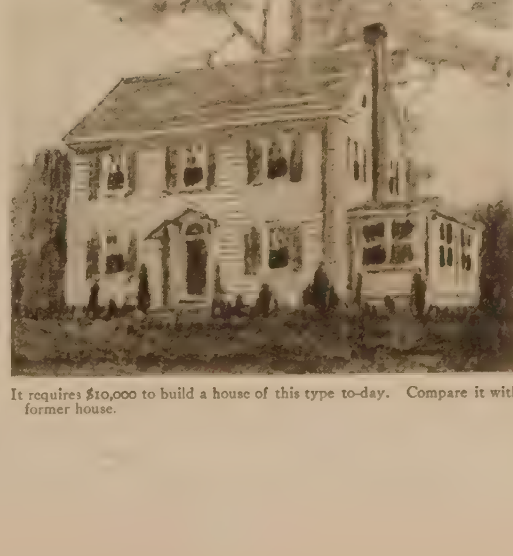
2. More radical means have been tried by certain firms which may not be approved by the profession, and yet which have brought very successful results. The architect has connected with his office a department which handles the construction in the same manner as a contractor. Outside bids may be taken, if the owner desires, in order to check up the estimates of the architect. This is not a difficult system of handling the small house, for neither the work of planning nor construction is so great as to overwhelm one organization. Of course this is not so practical with large buildings, but then we are all aware of the phenominal success of great construction corporations which supply the plans and put up the building, and handle the whole project even to securing the furniture. Such firms have frightened some architects into the feeling that the profession would be absorbed by such developments. But as a counteraction to them, it is not bad for the architects to work in the reverse way and absorb the contractor's end of the business, especially in the small house.

3. Still another attempt has been made to reduce costs by designing entirely with stock details and forms. Certain mills have secured high-class talent to design stock doors, cornices, windows, columns, and the like, which are very beautiful, and a careful use of them results often in much saving; but there is much doubt whether this can ever be made a satisfactory system, for some one must originally form these details, and after a while they will go out of the public style, and will revert back to the speculative builders to use in an awkward manner, as they have always done in the past. However, the use of standardized parts may be very successful in the hands of a good designer.

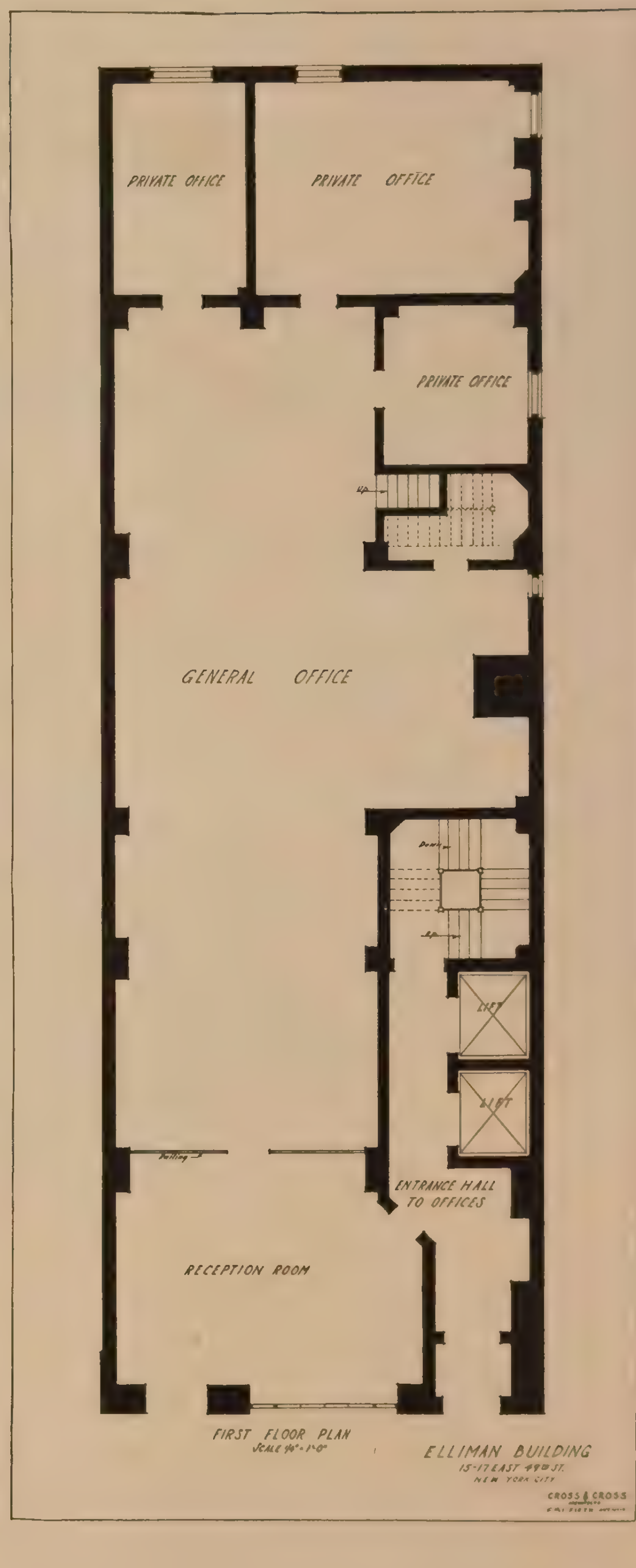
4. There is still another suggestion as a solution of the problem, and it is rather gloomy, yet it has many excellent points. One must frankly assume that the day of the small inexpensive house has gone beyond recovery. Conditions in the building trades have made it impossible, and most of the "own your own home propaganda" is bunk. It is pointed out that the average family cannot afford to own its own home as constructed to-day, but that it must join in co-operation with other families. In other words, the semi-detached house or the two-family house built in well-planned groups by large co-operative associations is the only practical solution for the individual house. Such groups will eliminate much of the expensive street paving as ordinarily required and cut to a minimum the water-supply lines and sewerage systems. Semi-detached houses in groups are capable of saving the cost on one outside wall, one chimney, one set of plumbing pipes for each house in the group. The heating may also be reduced to a community basis, and the land so distributed that the best air and light can be had with the miminum waste.

Whatever is the best solution, this fact stands out clearly, that the young architect who is going to compete in this class of work must be absolutely certain of the various forms of construction and materials which go into making a good house and how these may be abused by the speculative builder to underbid his honest design. If he is not well posted on this subject, he cannot hope to convince his client.

(*To be continued.*)



It requires $10,000 to build a house of this type to-day. Compare it with former house.



ELLIMAN BUILDING, 15 EAST 49TH ST., NEW YORK.

MR. ELLIMAN'S PRIVATE OFFICE.

RECEPTION-ROOM.

Cross & Cross, Architects.

ELLIMAN BUILDING, 15 EAST 49TH STREET, NEW YORK CITY.

The Functions of Lighting Fixtures

By M. Luckiesh

Director of Applied Science, Nela Research Laboratory

IN the broader view of lighting the lighting-fixture is considered chiefly as a means to an end. It is a link in the chain from the meter to the final lighting effect, but being visible it should be a satisfactory object from an artistic point of view. The usual view of lighting has been a superficial one, because fixtures have been considered too much as objects of art and too little attention has been given to the results which they are able to produce in a room if they are designed with lighting effect in mind. The chief criticism which may be directed toward lighting-fixtures is that they are aimless from a lighting view-point. The design of fixtures has been left to the artist, and artistic or supposedly artistic fixtures have been the product of the designer. However, here is a field for the correlation of science and art. The fixture should be designed scientifically for obtaining certain results, then the artist should be commissioned to clothe it in a satisfactory artistic exterior. However, in this discussion attention will be given only to an analysis of the functions of fixtures in lighting.

Fig. 1.

Of course, there are many fixtures used in lighting purely or predominantly for their beauty as ornaments. This practice will always continue because they cannot be excelled as decorative objects.

Fig. 2.

There are many thousand fixtures on display and illustrated in catalogues. One may enter a dealer's store and see hundreds of them massed on the floor, walls, and ceiling, but from the standpoint of lighting effect this vast number dwindles to a bare dozen types, excluding those that are purely novelties. The primary function of fixtures is to distribute light and, although no two of different design but of the same general class would distribute light in exactly the same manner, their general lighting effects are similar.

Fig. 3.

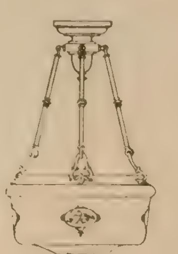


Fig. 4.

Fig. 5.

It is difficult to devise terms which satisfactorily describe the lighting effects produced by the various classes of fixtures, but an attempt will be made to utilize terminology in use despite its shortcomings. In the terminology associated with science it is strikingly true that progress is continually revealing errors and misconceptions of the past. For instance, many cling to the terms electricity and magnetism as though they were unrelated, as supposed years ago. Likewise, when the great divisions of physical science were first made, none of the learned men of that time suspected any relation between light and electricity. Hence, light has long prevailed as a distinct division despite the fact that light is now considered to be electromagnetic energy. It is well to reflect that all the fences are artificial and that they have been created for practical purposes and for reasons which may not appeal to the more mature and capable judgment of later years. In some cases it is difficult to find any traces to-day of barriers that in earlier ages seemed natural and inevitable. Even the formidable science of chemistry is fundamentally a science of physics, that is, it merges finally into physics. If it will be remembered that artificial divisions merge into each other, there will be no difficulty with the terminology.

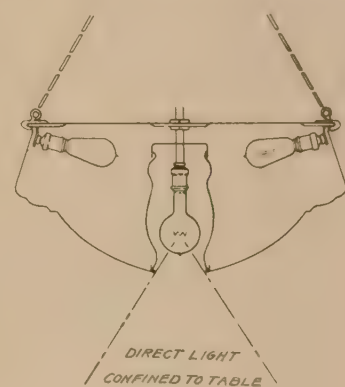


Fig. 6.

A similar condition exists at the present time in the terminology used in classifying lighting-systems. Direct lighting is fundamentally that produced by a fixture which directs most of the light generally downward upon the important area and is exemplified in simple form in Fig. 1. Indirect lighting is that in which the light reaches the important area indirectly, that is, the light is usually directed to the ceiling and upper walls to be reflected to the places where it is utilized. It commonly consists of an opaque bowl containing silvered reflectors surrounding the lamps, as in Fig. 2. Semi-indirect lighting is a combination of these two, and is usually accomplished by means of a diffusing glass bowl open at the top. Examples of semi-indirect units are shown in Figs. 3, 4, and 5, although the proximity of the bowl to the ceiling in Fig. 5 makes it approach a "direct-lighting" fixture. Fig. 4 represents a transition between Figs. 3 and 5. From such lighting-units some light reaches the important area, such as the reading-table, directly from the bowl, and some of the light escapes from the top to the ceiling to be reflected.

Certain fixtures might be considered to be "direct-indirect." For example, an opaque inverted bowl with a hole in the bottom, such as illustrated in Fig. 6, emits an upward component which reaches the place of utilization indirectly, and a direct component escapes from the aperture in the bottom of the bowl. Some fixtures are provided with pendant shades surrounding an inverted bowl, as that

illustrated in Fig. 7. These are direct-indirect units. In indirect lighting the primary light-sources are completely concealed, and the light in effect comes from secondary light-sources such as the illuminated ceiling. Furthermore, in so-called "concealed" lighting no fixtures in the ordinary sense are used, the lamps being concealed behind a cornice or moulding. This has been termed "cove" lighting.

This classification into direct, semi-indirect and indirect lighting has grown to be quite inadequate, owing to the tremendous progress and increasing complexity of the science and art of lighting. While it is convenient to use these terms in the absence of better ones, it is well to reflect that these divisions are quite artificial. From a scientific view-point it would be better to classify all fixtures in terms of the upward and downward components which they emit; however, for the present purpose this method would be unsatisfactory, because it would involve numbers or values which could not be visualized except by the expert.

As already shown, it is impossible to define accurately direct, semi-indirect, and indirect lighting, but a further discussion of this difficulty should help the reader to visualize the functions of fixtures. A bare lamp amid dark surroundings and a search-light projecting its beam into space are extreme examples of direct lighting, but a bare lamp in a room with light surroundings is also classified as direct lighting. Enclosing the lamp in a diffusing glass sphere reduces the brightness of the lighting-unit very much, but we still have a system of direct lighting. If these units are multiplied so that there are a dozen or a hundred in the same room we still have direct lighting. Now let us take an inverted glass bowl, which would be the basis of a semi-indirect system. If it is of clear glass, sand-blasted on one side, nearly as much light will be emitted generally downward as upward, but if it is made of thin marble very little light will be emitted downward by the bowl. However, both these extremes and all the intermediate conditions are termed "semi-indirect lighting."

Another example which may aid in appraising fixtures is illustrated in Fig. 8. A diffusing bowl is suspended a few inches below a circular white surface. Some of the light escapes directly from the bowl, and most of the remainder which is emitted upward from the source to the white surface is reflected generally downward. Thus it is seen that the fixture involves the principles of so-called semi-indirect and indirect lighting. However, the bowl, which in semi-indirect lighting is usually suspended at a considerable distance from the ceiling, is in this case hung close to the circular surface, which may be considered to be a very much contracted ceiling. The final result, as determined by the appearance of shadows and by other means, is quite similar to that of direct lighting from a large lighting-unit.

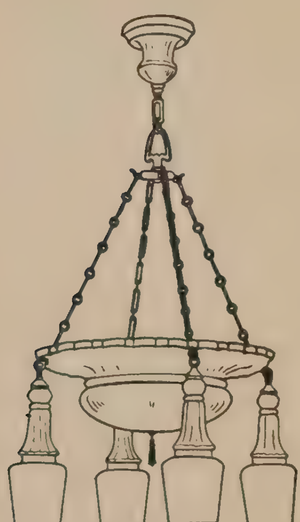


Fig. 7.

In the home this fixture can be fastened on the ceiling or it may be suspended from it. In large interiors it has the advantage of bringing a clean white "ceiling" close to the light-source.

A fixture which has the appearance of a semi-indirect bowl, but in effect is an indirect fixture, is illustrated in Fig. 9. The opaque bowl of an indirect fixture has been replaced by one of diffusing glass or of other translucent material, and a small lamp has been added to illuminate this bowl. This type of lighting-unit arose to meet the objection sometimes raised to the effect that we expect to see the bowl of the fixture luminous and are disappointed if it is not. In fact, this is one of many examples in lighting which demonstrate the influence of habit and usage. In this case it is interesting to note that the objection to the dark bowl of an indirect fixture generally wears off in time.

Fig. 8.

Luminous bowls can be very beautiful and desirable fixtures, but they do not meet the chief objection to totally or predominantly indirect lighting in the home. Some indirect light is desirable, but direct light from proper fixtures is indispensable to the best effects in general in the home.

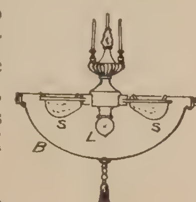


Fig. 9.

In indirect lighting-systems in which lamps are concealed in a cove or in an opaque bowl, the ceiling is the secondary light-source. If we imagine such an illuminated ceiling to contract and to increase in brightness until it becomes very small and very bright, we witness in the mind's eye an evolution from indirect lighting to direct lighting. If we follow this evolution, classifying it the while, at what point does one system end and the other begin? Wall-brackets are commonly considered as direct-lighting units, but if they are upright they usually omit an upward component because the upper part of the shade is open. This would provide direct and indirect light. In fact, nearly all fixtures desirable in the home omit upward and downward components, and it is safer to visualize their distribution of light in terms of these two components of varying proportions. However, it is necessary to have terminology in which to discuss or to classify lighting-systems, so that the foregoing will serve the purpose if they are understood to be general terms.

Regardless of these terms, the final appraisal of lighting-systems must be in terms of such factors as diffusion, tint, and distribution of light; the brightness of the shades and of the backgrounds; the relative amounts of scattered and direct light; the character of the shadows; the distribution of light upon the important areas of the room; the suitability of the intensity for reading or for other purposes; and the general mood of the room. No system is a catholicon. There is a place in residences for all that is good in lighting. The æsthetic problems or desires of taste are so varied that for their satisfaction a variety of fixtures must be available. However, there is a need for fixtures with more definite aims in meeting the demands occasioned by a broader knowledge of the possibilities of lighting. Light is a wonderful tool, important and useful beyond the conception of most persons. To use it successfully it is necessary to study that which is to be illuminated and to know the functions of fixtures.

Purely utilitarian lighting is sometimes the first consideration, but it is at least a by-product in all cases where artistic effects dominate. Lighting-fixtures should control light as efficiently as is compatible with the desired effect,

but efficiency involves satisfactoriness. Beauty and utility overlap; they cannot be considered separately in the home. Usefulness is a part of beauty and therefore a lighting-fixture cannot be beautiful if it does not fulfil its intended purpose regardless of the grace of its lines or of its expressiveness as a work of art. Beauty is the result of harmony—the accord of all the elements; therefore, when a lighting-fixture is intended to fulfil the double purpose of an object of art and of a distributor of light, the fulfilment of the latter aim is essential to harmony and hence to beauty. And, finally, to those accursed by miserly dispositions which do not permit them to see the usefulness of the rose, let us state that the utility of beauty is recognized by those who *live*.

Most lighting-fixtures distribute light symmetrically although by no means is the control of light confined to such distributions. In fact, many lighting-units are in daily use which provide asymmetrical distributions. For example, the show-window reflector is placed at the upper front of the window, and although it hangs in a pendant position it directs light downward and backward. Such units are in use for illuminating pictures on walls, and have even been designed for wall-brackets, so that the light is directed predominantly away from the wall. On the other hand, half-shades are in use on brackets and portables to illuminate pictures or ornaments, or to provide an indirect lighting by reflection from the walls. The reflectors used behind cornices in imitation of flower-boxes on the wall should be of the asymmetrical type, so that the light is directed away from the wall and upward instead of being confined to a spot on a portion of the adjacent wall. For the concealed units of this type the silvered and metal reflectors are usually satisfactory, but where they are not concealed the so-called prismatic glass reflectors satisfy utilitarian purposes. The latter are useful, for example, in the kitchen, if light is to be directed predominantly toward the cooking range or work-table. It would be tedious to read the detailed uses for such units, so they will be passed by with this brief mention. It is sufficient to know that such are available, so that they may be utilized when they best serve the needs.

In this general view of the functions of fixtures a discussion of details would lead far afield. There are numberless designs available, and it is surprising how many fixtures widely differing in appearance will produce approximately the same lighting effects. On the other hand, fixtures appearing quite similar may produce very different lighting effects. Herein lies one of the potential features of lighting, for a desired lighting effect is not limited by the appearance of the fixture. In choosing fixtures the lighting effects which they produce are of primary importance, and if these effects are not obvious from the construction of the fixtures the purchaser should demand that they be demonstrated under conditions which are favorable to the formation of a judgment concerning them. In general, a fixture which contains two or more circuits, each providing a lighting effect distinctly different from the others, is a more potential factor in lighting than aimless fixtures which produce only one effect.

It is not difficult to appraise a fixture. If it is a shower the shades should be deep enough, and of such shape that the lamps are concealed. Even a satisfactory fixture of this sort, if hung too high, for example, over a dining-table, becomes undesirable. Owing to the variation in the heights of ceilings this factor becomes important. Many beautiful brackets are equipped with frosted lamps, but these cease to be beautiful when lighted. In fact, they are usually very glaring. This is an excellent example of lack of foresight and slavishness to "art" on the part of the designer. The fixtures are too often visualized by him only as objects; if he visualized them lighted he would not be guilty of their design without shades. In a similar manner the candelabra with its cluster of unshaded frosted lamps evolved. In general, such lamps are usually glaring and, therefore, can have no place in an artistic lighting-scheme in the home. If such fixtures are hung high in large exteriors with light ceilings they may not be glaring. By equipping them with shades the annoying condition is replaced by a charming restful effect. In general, there is no place in the home for unshaded lamps. They are satisfactory under some conditions in large interiors when glittering splendor is desired, but rooms in ordinary homes are too small to afford escape from the glare of unshaded lamps.

If the appraisal of fixtures progresses in this manner, gross mistakes will not occur in the choice of fixtures. A judicious use of common sense combined with focussing the attention upon the manner in which fixtures distribute light will be productive of satisfactory results. But it should be remembered that lighting effects do not depend solely upon so-called fixtures. Lamps are easily concealed in architectural and other ornaments and special construction often yields results which are novel and interesting. In general, then, lighting effects are of primary importance, and, excepting in those cases where fixtures are purely ornamental, the appearance of fixtures is a secondary though important consideration. It is always possible to satisfy the latter requirement without sacrificing the desires as to lighting effects. In fact, the uninitiated are likely to be surprised at the similarity of lighting effects which can be obtained from fixtures apparently differing widely in construction.

The C. C. Merritt House

THE idea was to get an architectural effect with simple, inexpensive materials put together in an inexpensive way. There was a large quantity of stone on the premises, and it was laid up just as a foundation wall would be from start to finish. All of the joints were slushed and pointed up roughly, and on completion given a coat of whitewash of half parts of white Atlas and limoid with a percentage of waterproofing compound in it.

You will note that there are no sills and that the outside steps, etc., are of brick and blue stone flagging.

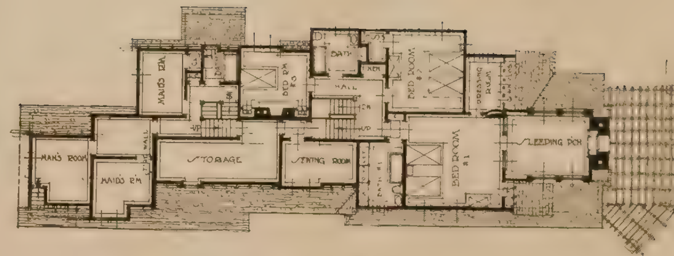
The flat roof is tar and gravel, and the others tile. Unfortunately, the variations in colors and the cement beds these are laid in do not show in the photographs. There is a minimum of trim used throughout the house—none to the windows except a stool. A very small, plain base and only a mould at the door-casings. The wide-board floors throughout the first floor are white pine of variable widths. Inexpensive hardware is used. Plain T hinges and ordinary thumb latches throughout. What little ornament there is, such as the doorways, mantels, and stairs, was concentrated on and well done. The service part of the house—kitchen, laundry, and pantry—were more extravagantly treated, because I used steel dressers, cork tile floors, and considerable electrical equipment.

All the plastering throughout is in the brown finish, just trowelled up a little smoother than usual, but showing the trowel marks.

RESIDENCE FOR CHARLES INGRAM, GREENWICH, CT.

Warren & Clark, Architects.

DINING-ROOM.



SECOND STORY PLAN

FIRST STORY PLAN

RESIDENCE FOR CHARLES INGRAM, GREENWICH, CT.

Warren & Clark, Architects.

RESIDENCE FOR CHARLES INGRAM, GREENWICH, CT.

Warren & Clark, Architects.

Concrete Construction

By DeWitt Clinton Pond, M.A.

IN the previous articles on reinforced-concrete design, principles were investigated but their practical application was only vaguely hinted at. For the purpose of summing up all the foregoing information an actual problem in design will be taken, and all the principles and their applications will be thoroughly discussed.

A building, known as the No. 395 Hudson Street Building, is, at the time of this writing, being erected in lower Manhattan. This building is to be one of the largest reinforced-concrete structures in the Borough of Manhattan, and perhaps one of the largest built for commercial purposes in the country. In plan it will cover an entire city block, and its longest dimension will be 339 feet 9¼ inches. Its width will be approximately 200 feet.

The firm of McKenzie, Voorhees & Gmelin are the architects and the Turner Construction Company the contractors for this structure. The author wishes to acknowledge the help which he has received from the architects and engineers.

The building will be used for several purposes. One portion, which will be five stories high, will be used for a garage on the first floor and for a shop on all the other floors. The other portion, which will be nine stories high, with a large two-story penthouse above, will be used as a warehouse on the first, second, third, fourth, fifth, sixth, and part of the seventh floors. The other part of the seventh and the eighth floors will be used for a shop. The ninth floor will be utilized as an office floor, and the first floor of the penthouse will be given over to use as a dining-room, kitchen, conference room, and also a rest-room for the women employees. The penthouse will be large, but there will be a fair roof area around it which will be used for recreational purposes. It is probable that handball courts will be installed, or bowling-alleys. The second floor of the penthouse will be used for tanks for the sprinkler, house, and stand-pipe systems. These tanks will have a total capacity of 72,000 gallons of water. On this floor there will also be elevator machinery, fans, a refrigerating-plant, and other mechanical equipment.

Owing to the several uses that the different floors will have, there will be variations in live loads as well as in types of construction. Most of the construction will be flat slab construction, but owing to the fact that over a portion of the first floor there will be stored electric conduit, the live load on this portion of floor will be considered as 1,000 pounds per square foot, and beam and girder construction will be used to support it. As the ninth floor will be used for office purposes, it is desirable that columns be eliminated as much as possible, and so, many of the columns stop at the ceiling of the eighth floor, and forty-foot spans are encountered in the tenth floor and roof construction. Here again it is necessary to use beam and girder construction. In order to conceal these girders and beams a hung ceiling is used over the ninth floor.

It will be seen that a study of the engineering problems involved in the design of such a building will furnish a very complete résumé of all the information given in the second series of articles of "Engineering for Architects."

The method employed by the engineers in attacking the problem of design has been to first determine the column loads and develop a tentative column schedule. Then these loads have been brought down to the footings, the footings designed, and then the columns and floors have been designed from the basement up. This method has been used in order to enable the actual work of construction to proceed almost as soon as the floors and columns have been designed.

Owing to the very large size of this building it will be impossible to undertake the design of all the slabs, beams, girders, bands, columns, and footings. Only a section of the floor plan will be discussed, and this will include nine bays at the corner of plan which is located at the intersection of Clarkson and Hudson Streets. In these nine bays most of the different types of construction used in the design of the building will be found.

Fig. I shows the architectural plan of the first floor for this portion of the structure. It will be seen that the

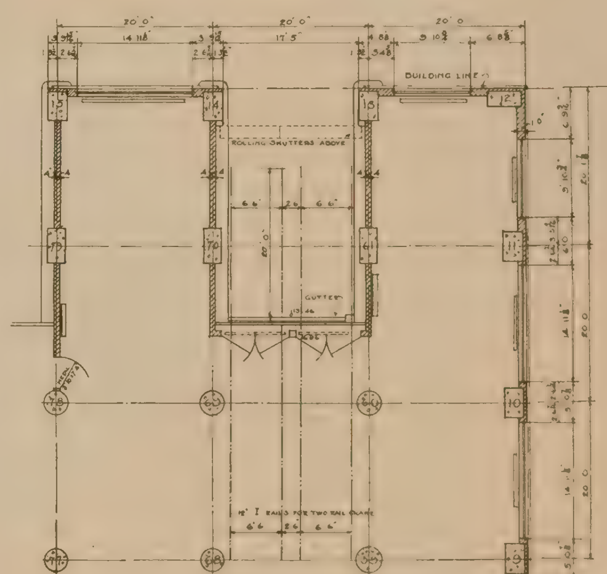


FIGURE I

nine bays, or floor panels, measure 20 feet by 20 feet, except those along the north side of the building, which measure 20 feet 1⅞ inches by 20 feet. In the centre panel there is a wagon court. Above this are four crane beams, which will be carried on the second-floor construction. Between each pair of crane beams motor-operated hoists will be suspended. These hoists will be used to lift bodies off trucks and carry them into the building, where they will be unloaded. The floor level of the wagon court pitches toward the back, and a gutter is located under the loading platform. In general the loading platform and first floor are 3 feet and 6 inches above the level of the wagon court. This will mean that certain beams and girders will be at

different levels, as noted *G*5-below and *B*40-top, in the structural plan, Fig. II.

This structural plan shows the spacing of beams and girders. Slabs are designated by the letter *S*, beams by

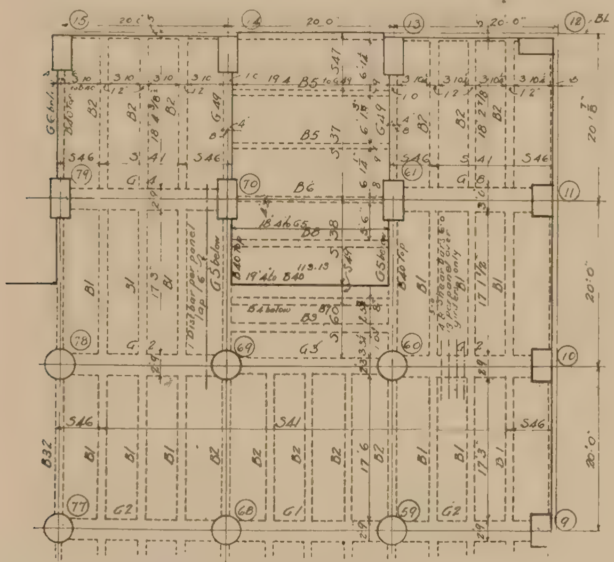
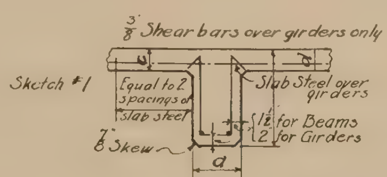


FIGURE II

B, and girders by *G*. The lists which are shown in Fig. III and Fig. IV give the depths and other dimensions of the structural members, and it is only necessary to refer



List of Beams & Girders												
Mk	Total No	Size				Square Steel				Stirrups	Sk.	Near
		a	b	c	d	D.B	Str	No Layers	In Top	Plain Steel	No.	Col
B1	12	1'2"	2'6"	5"	5"	2-1⅛"	2-1⅛"	1		10-½"ϕ	1	60
B2	11	1'2	2'6"	5"	5"	1-1⅛ 1-1¼	2-1¼	1		10-½"ϕ	1	59
B4	1	1'1	2'6"	0	4½	2-1¼	3-1¼	1	2-1"□	14-⅜"□	14	60
B5	2	9"	2'6"	4¾"	4¾	1-1¼	2-1¼	2		10-⅜"□	1	13
B6	1	8"	2'6"	4½"	4¾	1-1¼	2-1⅛"	2		10-⅜"□	1	61
B7	1	8"	1'0"	4½	9"		2-¾"	1		4-⅜"□	13	60
B8	1	8"	2'6"	4½"	4½"	1-1¼"	1-1⅛ 1-1¼	2		10-⅜"□	1	61
B32	1	1'0"	2'6"	10½	5"	1-1¼	2-1¼"	1		10-⅜"□	1	77
B40	3	10"	1'0"	0	5 4¾		2-¾"	1		4-⅜"ϕ	24	60
G1	1	2'9	3'8"	5"	5"	5-1¼	5-1¼	1		14-⅜"□	1	59
G2	4	2'9"	3'8	5"	5"	6-1¼	6-1¼	1		14-⅝"□	1	59
G3	1	2'3"	3'2"	5"	4¼	2-1¼ 2-1⅛	3-1¼ 2-1⅛	1		6-½ 6-⅜ 6-½	1	60
G4	1	2'9	3'8"	5"	5"	7-1¼ 1-1⅛"	7-1¼ 1-1⅛"	2		14-⅝"□	1	70
G5	2	1'8	3'6"	4½"	0	3-1¼	2-1¼ 2-1⅛	1		20 ⅜"□	20	69
G6	1	1'0"	3'4"	4¾	0	1-1¼ 1-1¼ ⅝	2-1¼	1		20 ⅜"□	15	70
G8	1	3'0"	3'8"	5"	5"	4-1¼ 2-1⅛	7-1¼ 1-1⅛"	1		14-⅝"□ 6⅜"□	1	61
G49	2	1'0"	6'10"	5"	4¾		3-1⅛"	1		20-⅜"□	9 34	14

FIGURE III

to these lists to find out the amount of steel used, or any other bit of necessary information.

The first problem in design to be investigated will be the design of a typical slab. It will be noticed that the majority of the panels are framed alike. The panel enclosed by columns 68, 69, 77, and 78 can be considered as typical.

The beams run north and south and the girders east and west. The beams divide the panel into four parts, and there is one beam in the centre of the panel. Usually beams are spaced farther apart, but the live load is so heavy in the present case that it is better to space them closer on centres in order to avoid thick slabs and deep beams.

The spacing shown on the structural plans gives a span of 3 feet 10 inches for the slab, 17 feet 3 inches for the beams, and 20 feet for the girders. The structural plan shown in Fig. II is the actual one used in the work of constructing the building, and it is obviously not the regular method of procedure to have the plan before one when the actual design is worked out. It is something like having the answer given to the problem before the problem is stated. However, the author will endeavor to approach the

Slab Schedule					
Mk	Total No Slabs	Slab Thickness	Steel Bars	Remarks	Near Col.
			Size and Spacing		
S 37	2	4¾	½"ϕ Rods 8½" o.c.	1-⅜" Dist Bar per panel	14
S 38	2	4½	½"□ Bars 8½ o c	1-⅜" Dist. Bar per panel	70
S 41	18	5"	½ ϕ Rods 7¾" o c.	1-⅜ Dist. Bar per panel	59
S 46	10	5"	½ ϕ Rods 6 o c.	1-⅜" Dist Bar per panel	9
S 47	1	4¾	½"ϕ Rods 8½ o c.	1-⅜" Dist. Bar per panel	13
S 60	2	4¼	⅜"□ Bars 5 o.c.	1-⅜" Dist Bar per panel	

FIGURE IV

design of the structural members in the spirit of a new problem, and the reader can check the results by referring to the dimensions and sizes given in the plan.

The engineer in first laying out his work would probably divide the bay in four parts, spacing his beams 5 feet on centres. The beams would then be considered as being 1 foot wide, leaving a span of 4 feet for the slab. The typical slab would then be 1 foot wide and 4 feet long.

The next step in the design of the slab will be the determination of the load upon it.

The load per square foot upon the slab will be the usual combination of dead and live loads. The live load has already been given as 1,000 pounds per square foot. The dead load, or weight of the slab, depends upon the thickness of the slab, and this will be assumed as 5 inches. By referring to the first article on concrete it can be seen that for every square inch in the area of the cross-section there will be a pound added to the weight of a square foot of floor slab. In other words, as there are 60 square inches in a slab measuring 5 inches by 12 inches, there will be 60 pounds of dead weight for every square foot of slab. To this must be added the weight of the flooring. This is wood block paving and will be considered as having a weight of 25 pounds per foot. The total weight per square foot of floor area will be 1,085 pounds, and the total weight on the slab will be $1{,}085 \times 4 = 4{,}340$ pounds. Applying the formula $M = \frac{1}{12} Wl$, and considering l as 4 feet plus 5 inches, the maximum bending moment will be $\frac{1}{12} \times 4{,}340 \times 53 = 19{,}168$ inch-pounds.

To find the actual effective depth, equate this with $1{,}279.7d^2$.

$$19{,}168 = 1{,}279.7d^2.$$
$$d^2 = 14.9.$$
$$d = 3.8.$$

Allowing for fireproofing, the thickness assumed as 5 inches is found to be satisfactory.

(*Continued on page* 284.)

BUILDING AT RESERVOIR.

RAILROAD STATION.

Study & Farrar, Architects.

BUILDINGS FOR WATER DEPARTMENT, CITY OF SAINT LOUIS, MO.

PUBLIC COMFORT STATION, COMPTON HILL.

DISTRIBUTION STATION, CHESTNUT STREET. Study & Farrar, Architects.

BUILDINGS FOR WATER DEPARTMENT, CITY OF SAINT LOUIS, MO.

(*Continued from page* 281.)

The next step is to find the stress in the steel. $M =$ 19,168 inch-pounds. Also $M = S \times \frac{7}{8} \times d$, or, by transposing, $S = M \div (\frac{7}{8} \times d)$. By equating these two equations the following result is obtained:

$S = 19{,}168 \div (\frac{7}{8} \times 4)$.
$S = 19{,}168 \times \frac{2}{7} = 5{,}479$ pounds.
$5{,}479 \div 16{,}000 = .34$ square inches.

The area of a $\frac{1}{2}$-inch round bar is .1963 square inches. $.34 \div .1963 = 1.74$ bars in 12 inches of slab, or $12 \div 1.74 = 7$ inches on centres. The slab will be 5 inches deep, and will have $\frac{1}{2}$-inch round rods spaced 7 inches on centres.

The next step will be the design of a typical beam. It will be remembered that in the preliminary study it was decided that the beams would be 5 feet on centres and 1 foot wide. Owing to the unusually heavy live load, the beam will be assumed to be 2 feet 6 inches deep, and the girders will be assumed to be 2 feet 6 inches wide. These dimensions may be modified after calculations are carried through. If the girders are 2 feet 6 inches wide, the beams will be 17 feet 6 inches long. It must be remembered that all figures given so far are only tentative.

As in the case of the slab, it will be necessary to find the load on the beam. The load on the slab was found to be 1,085 pounds per square foot. To this must be added the weight of the beam. If the beam is 2 feet 6 inches deep, it will project 25 inches below the slab, and as it has been assumed to be 1 foot wide, the weight of the concrete below the slab will be $12 \times 25 = 300$ pounds. The load per square foot of superficial floor area will be $300 \div 5 = 60$ pounds. Adding this to the load of the slab, the total weight per square foot of floor area carried by the beam will be 1,145 pounds.

The total weight on the beam will be $17.5 \times 5 \times 1{,}145 = 100{,}187$ pounds. $M = 100{,}187 \times 240 \times \frac{1}{12} = 2{,}003{,}740$ inch-pounds. From the equation $S = M \div (\frac{7}{8} \times d)$, and taking the *effective* depth as 28 inches, the stress in the steel can be determined.

$S = 2{,}003{,}740 \div (\frac{7}{8} \times 28) = 81{,}656$ pounds.
$81{,}656 \div 16{,}000 = 5.1$ square inches of steel.

By referring to the table in the first article on concrete construction or to any steel handbook, the areas of bars can be found. If it is decided to use four bars, each bar must have an area of $1\frac{1}{4}$ square inches. It will be seen that four $1\frac{1}{8}$-inch bars will be sufficiently strong. Two will be bent up and two straight.

Shear must next be investigated. The load on the beam has been found to be 100,187 pounds, and each reaction will equal 50,093 pounds. The effective area of the beam will be $\frac{7}{8} \times b \times d$. Substituting for b and d, this expression becomes $\frac{7}{8} \times 12 \times 28 = 294$ square inches. $50{,}093 \div 294 = 170$ pounds per square inch. As the Building Code only allows a unit shear of 150 pounds, the result obtained above is too large. Rather than increase the depth, it will be better to make the beam wider.

$\frac{7}{8} \times b \times 28 \times 150 = 50{,}093$.
$b = 50{,}093 \div (\frac{7}{8} \times 28 \times 150)$.
$b = 13.6$ inches, or approximately 1 foot 2 inches.

The slight increase in width will cause the dead load on the beam to increase slightly, and it might be well to check the calculations over to see if the steel will be overstressed. The steel will be found to be strong enough.

In accordance with the calculations already carried through, a typical beam will have a width of 1 foot 2 inches and a depth of 2 feet 6 inches. It will have for reinforcing against bending two $1\frac{1}{8}$-inch double-bent square bars and two $1\frac{1}{8}$-inch straight bars.

As a matter of checking, the next item to be investigated will be the compression in the concrete. The beam being a T beam, the cross of the T will be 74 inches long, and the distance from the top to the neutral axis $10\frac{1}{2}$ inches. There will be no attempt made to explain the calculations given below. They can be checked by referring to the earlier articles on concrete.

Arm of the T = $6 \times 5 = 30$ inches.
Total width of cross = $30 + 14 + 30 = 74$ inches.
Area of cross = $74 \times 5 = 370$ square inches.
Distance to neutral axis = $\frac{3}{8} \times 28 = 10\frac{1}{2}$ inches.
Compression at top = 650 pounds per square inch.
Compression at neutral axis = 0.
Compression at lower side of slab = 310.
Average compression above lower side = 480.
Total compression in cross = $480 \times 370 = 177{,}600$ pounds.
Total compression in stem of T = $155 \times 77 = 11{,}935$ pounds.
Total compression in concrete = 189,535.

This is much greater than the stress in the steel, so the beam is safe as far as compression in the concrete is concerned.

In following articles the design of stirrups will be taken up, as well as the design of other members in the floor design.

Announcements

Mr. Clarence E. Wunder, announces that owing to increased business the architectural and engineering firm started by Mr. Kurt W. Peuckert in 1894, changed in 1910 to Peuckert & Wunder, and since Mr. Peuckert's death, in 1914, continued by Mr. Wunder at 310 Chestnut Street, Philadelphia, will move on July 21, 1920, to larger and more convenient offices at 1415 Locust Street, where the business will be continued with the present efficient personnel under the new firm name of Clarence E. Wunder, architect and engineer.

Coffin & Coffin, architects, announce the removal of their office to 522 Fifth Avenue, New York City.

C. Howard Crane, architect, Elmer George Kiehler, associate, Cyril E. Schley, announce the opening of a Chicago office at 127 N. Dearborn Street, to be in charge of Mr. H. Kenneth Franzheim.

Peacock & Frank, architects and engineers, announce the opening of offices at 520–521 Colby-Abbot Building, Milwaukee, Wisconsin.

The Road Back to Human Ideals

IT is not enough to be born healthy and happy into this world; we must in addition be nourished and trained in order to reach maturity and to enjoy the fulness of life itself. Without training we lack judgment, and without experience we shall grow up warped and narrow, incapable of appreciating our fellows and unable to make the best of our own lives. It is unfortunate that modern education utterly fails to enlarge the vision; indeed, in its general effect it seems definitely to narrow and impair the faculties of perception. The old humanistic touch has gone; materialism has thrown its dull shadow over the ancient sunlit places, and the fruit of the mind does not ripen as of old. How otherwise can we explain the lamentable shortcomings of to-day? In an age of marvellous mechanical achievement, of perfect and unparalleled technic, scarce an artist can be found, save one or two who painfully search in the track of the acknowledged masters of the past; and the multitude who take our galleries and museums for granted are content to leave their faculties undeveloped, and are not even perturbed by their inability to appreciate or discriminate the work of men who lived in life's fulness and spent their days in interpreting its joy.

Yet the men and women of to-day are not without the full tide of life in their veins. Joy and sorrow, the divine beauty of human character, as well as its attendant foils, and the lines and color of human and natural beauty, engage their lively interest; passions, impulses, and even inspiration, are yet strong and insistent. But judgment in the larger sphere is strangely lacking. Ideas are in disarray. The wildest theories gain currency. Fantastic opinions are thoughtlessly uttered. All that is expressed in the word "design"—the synthetic and creative genius which is instinct in the created universe—this, the very breath of art, seems aloof and distant from the modern mind. The masterpieces of mankind are tolerated, bought and sold for large sums, even made the occasion for fashionable parades of dress, and honored by the dry and incomprehensible disquisitions of eminent *virtuosi*, but never arouse the people to a passion of admiration or a frenzied attempt to rival their beauty.

The labor sickness in the country at the present time is not traceable in the main to any of the causes commonly held to explain it; it is symptomatic of a lack of interest in craft. A man's work is no longer the natural outlet for that part of his nature that cries for expression.

It is so strange a circumstance that the most essentially human organs should cease functioning that most people refuse to believe it and seek refuge in an attempt to prove that the whole condition of life has altered. That the conditions of life have changed there is no question, but these people deceive themselves if they judge that any change of condition, however apparently revolutionary, will in the smallest degree modify the need which men feel for art and all that it means.

We have said that education has lost its old potency, and there is very little doubt that the paralysis of the art-interest is largely due to the completely changed orientation in life caused by natural science.

It is not that modern science and modern art are antagonistic. They are of the same blood, and there is too much of a family compact between them to admit of antagonism. The analytic genius of a century has been busy on a minute examination of the structure of natural forms and of the exact working of the dynamic forces of nature which have been harnessed to our use. Our mental forces exhaust themselves on objective research. We even attach ourselves to the natural processes and regard ourselves objectively and dispassionately. Yet we have solved none of the greater mysteries of life; we have resolved none of the paradoxes which are involved in the passions and deep desires implanted in our hearts. The desire to reconcile good and evil, and the yearning for immortality, are not satisfied by the deftest of mechanical devices, nor is the principle of natural selection a touchstone which will transmute the thousand perplexing riddles of daily life into golden harmony. But music and poetry, painting and architecture, when loved and fashioned by men and women of all classes, act like a charm and bind the broken fragments of our experience into a thing which satisfies the mind and heart. For in these arts man is not merely exploiting nature for his material advantage, nor seeking knowledge for material ends; he is using the divine instinct of creation within him, forming and devising in his handiwork the harmony which he believes and wants to believe to be the underlying principle of all life.

To some it will seem that a considerable mental effort is required to gain that simple, trusting attitude toward life which makes for beautiful craftsmanship for its own sake. But nothing of the kind is required. The road back to human ideals is by the study of the work of the artists of the past, of a time untouched by the particular disease that vitiates modern production. Many people are obsessed with the notion that the study of old work can only lead to the fettering of originality and the enslavement of the mind. Let us dismiss the idea utterly. Good craftsmanship yields to the student innumerable secrets of the means of expression, and inspires him to emulate, not copy, the artist. In the days of apprenticeship a gifted master will have a great following, and among his pupils there may be some who will never rise above the standard of competent journeymen. Yet even these will not be servile copyists; they will content themselves with the discoveries of their master, and perpetuate the principles of his technic.

It is not a fanciful theory that the measure of our means of expression is largely dependent on our knowledge of the work of the great artists of the past, for without the language built up by them we must remain largely inarticulate. The church, it is true, in ten centuries invented and brought to perfection a language of art which we call Gothic; but this could not become permanent, and the Renaissance proved the necessity for the world-wide conventions which we know by the name of the classical style. If we would invent a new language we must postulate an entirely new civilization, and one superior in staying power to the Christian community of the Middle Ages. Moreover, in order that we should have the benefit of the vast experience of the race, nature has arranged that all human activities should be governed by the convention of time, instead of providing that everything should happen contemporaneously. So through the records and monuments of each age we are able to know the result of life under all conditions, and gain wisdom and judgment by their comparative study.

From an article in The Architectural Review, London, on "Should London Preserve her Churches."

Artist's Drawing of the Big New Warehouse and Loft Building Now Under Construction at 395 Hudson Street, New York

McKenzie, Voorhees & Gmelin
Architects

Turner Construction Co.
Builders

This building, when complete, will be occupied jointly by the Western Electric Co. and the New York Telephone Co., and will occupy the entire block surrounded by Hudson, West Houston, Greenwich and Clarkson Streets. The building furnishes a most interesting side-light on the trend of building design in Manhattan. For many years it has been popular to assume that reinforced concrete, although an ideal material for industrial structures, could not be used for loft and office buildings and apartment houses. With the present cost of labor and material, however, the economy in favor of reinforced concrete is so big that many owners are now turning to this material as the only way out of their difficulties. In this time of building shortage many office and loft buildings 12 stories and less in height could be efficiently, economically and expeditiously built of reinforced concrete.

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